JUN 24 1921

In This Issue—*What's Wrong With Service?*

MOTOR AGE

Volume XXXIX
Number 25

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, JUNE 23, 1921

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Three Dollars a Year

Champion
Dependable Spark Plugs

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Champion "X" 75

Champion Spark Plug Company
TOLEDO, OHIO

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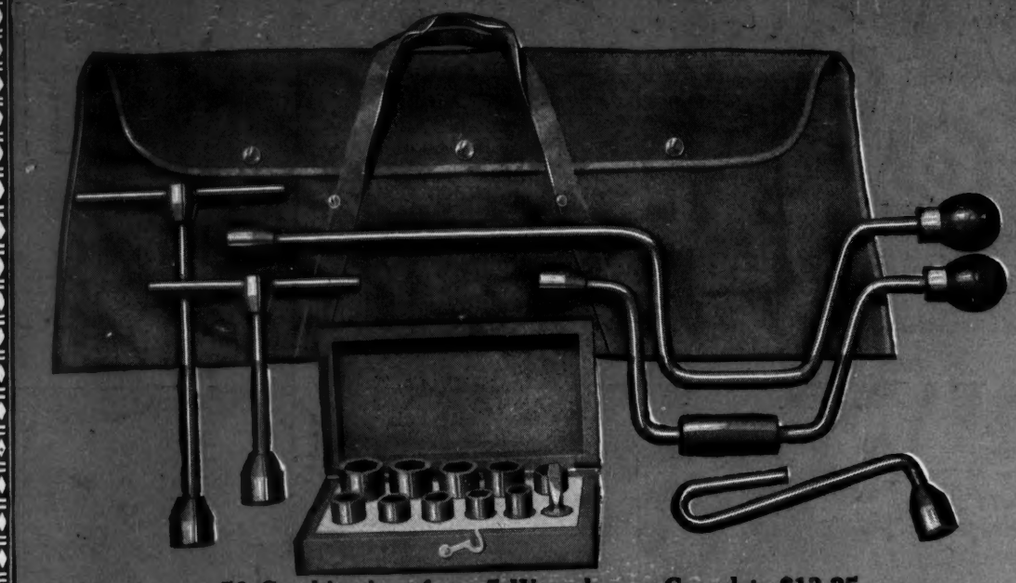

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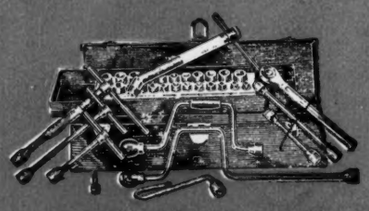

No. 500 Mechanic's Kit Equivalent to 768 Wrench Combinations

Sockets are finely machined, broached and hardened.

MOTOR AGE

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MALLERS BUILDING

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CARBON ARC
SODERWAND
"Solders Like Magic"

Pesky Electric Jobs

are taken care of easily by Soderwand.

Soderwand keeps the solder so hot that it flows into every crack and crevice, freely and surely. That makes the connection solid. It makes it conduct the "juice" well.

With a Soderwand you can reach into any narrow corner or inconvenient place. It has four extra points priced at $1.50 each. One is very slender for fine wire soldering and radiator repairs. The others are shaped for any soldering you care to tackle.

Soderwand is heated by electric arc, the same means scientists use to melt platinum. So terrific is the heat you need use it only one minute in five. That uses mighty little current. The carbons cost only a nickel a piece, and last for weeks in garage service.

Write for an illustrated folder.

BACO ELECTRIC COMPANY
BODE, IOWA

You Can Make More Money-
By Selling Valves Than By Grinding Valves

Take Flexedge Valves, for instance. From the sale and installation of one set you will make as much profit as you would on *several* valve grinding jobs.

In addition to that you'll be selling a man valve insurance. When you put in Flexedge Valves you know the little old motor is going to show more pep and you know she's never going to develop valve trouble. Your customer will soon find that out too and he's going to have a lot of respect for your judgment and look upon you as a repairman or dealer who knows his business.

In other words you'll cinch his future business—and that's the best way in the world to build up a good, profit-paying trade.

Flexedge
VALVES You Never Need Grind

Instead of being one solid piece, the head is made of laminations hot forged to the stem, with heavy plates at top and bottom to give rigidity. In the closing stroke, when the valve head strikes the seat under the tremendous force that brings it down the edges of the laminations are flexed very slightly (about .001"). This flexing frees the head and seat of any carbon that has been deposited. A smooth, shiny surface is maintained *always*—the seal is compression tight—the valves never need grinding. The resulting valve performance is something that hundreds of repairmen have marveled at. It means money for every dealer and repairman selling Flexedge Valves.

See your jobber or write to us for complete information.

Cross-Section of a Flexedge Valve

Illustrating the structure of Flexedge Valves. As the valve head strikes the seat the edges of the laminations are flexed slightly and free the seat of carbon deposits. Thus the valve seats itself and always holds compression.

SELF SEATING VALVE CO.

340 W. Huron St. **Chicago, U. S. A.**

Vol. XXXIX, No. 25 CHICAGO, June 23, 1921 $3.00 Per Year

MOTOR AGE

The Automotive Industry Exists Today Because of the Good Will of the Ultimate Consumer

WE can talk all we want about service, flat rate methods or repair work, or anything else associated in any way with the automotive industry, and after all has been said and done there is just one man to consider—the car owner.

AS an industry we are sitting about a table at the head of which sits Mr. Carowner. At each side we have our esteemed friends, the maker, the distributor, the dealer, the service man, the accessory man and others. We're all eating out of the same bowl and the bowl happens to be in charge of the man at the head—Mr. Carowner.

HE is a pretty fair sort of person and the chances are will give all of us a generous portion. And, maybe if we are good to him he will give us just an extra spoonful or so. Therefore, let's make sure we know him—his whims, his likes and dislikes. The more we know of him the better able we shall be to please him and pleasing him means to us our daily bread and butter.

What's Wrong With Service?

And Where Shall We Begin to Put It on a Sound and Legitimate Basis—There Still Is Too Much Talk of "Robbers" and "Gyps"—Equipment and Methods of No Avail If House Policy Is Wrong

By B. M. Ikert

A Half Dozen Subjects Worthy of Serious Thought

1.—Too many car owners are "through" with the service stations. They will attempt most of the adjusting and repairing necessary. They may seek other than the dealer's service station.

2.—Very often, too often in fact, the car owner gets a severe jolt in the service station. He is used to good business methods in the department store, the drug store and other well-conducted businesses and is disheartened when brought into contact with the loose business methods of some of our service stations.

3.—The car owner knows the condition of his car best. At least he should be allowed to tell the mechanic or service man what he believes to be wrong with it. A doctor lets his patient tell him how he feels.

4.—Record things. Never let a customer go out without his knowing what you are going to do to his car. And, what's more, be sure the things are done. A system of inspection will do the trick. Hang the job on someone competent.

5.—Remember your customer is your meal ticket. If he never comes near your place, you don't eat. Just imagine him as sitting at the head of the table handing out your share of the food. If you are kind to him he may hand you a little larger portion.

6.—Consider the fixed price or flat rate plan of selling service. It has worked wonders for many service stations and can do the same for you. The old excuse "it don't fit my conditions" doesn't hold any longer. It has proved otherwise. When you use a system of this kind you have something definite to sell. In the past the trouble has been that we did not know what we were selling and what we were giving away.

THE other day a man who recently bought a car remarked as follows:

"I'm certainly through with these guys in a service station, when it comes to doing any work on my car. I haven't a great deal of time to spend in tinkering with a car, but it seems the only way to get anything done on it is to do it yourself.

"You know I bought this Runwell car from Blank's a short time ago and they told me to bring it back in about a month or so to look her over and give her a general tuning up.

"Well last Friday I left the car there. I had made mention of several things which I knew ought to be fixed above anything else. For one thing two of the tappets were noisy and from the month's driving I had done I noticed the hood would shift back and forth over roads that were inclined to be rough. I thought this easily could be fixed.

"Then the right rear door needed a little work. It would not stay shut and from what little I know about such things all that was necessary was to take out two screws of the catch and file it down a bit so the latch would slip all the way in.

"I had lost a grease cup from one of the rear spring shackles. This, according to what I know of lubrication meant screwing into the threads another cup.

"Then there was a nasty squawk somewhere around the point where the front fender joins the hood sill. It didn't hurt the running of the car, but it was irritating and they said it could be fixed in a jiffy.

"Well, Saturday I got the boat. They had her parked outside at the curb and said she was all ready to drive away. They had given her a good tuning and tightened her wherever needed, etc.

"There was no charge for the work, except that I had to pay a small sum for the new oil they had put into the engine.

This was perfectly legitimate, I thought, so I paid the bill and drove the car away.

"I had gone a short distance when I hit a little stretch of rough road and instinctively my eye rested on the hood. Sure enough, it still was careening around like it had done before. Then I got to thinking about the other things they were going to do.

"I decided to stop for an investigation and as I slowed down the right rear door flew open. It hadn't been touched. I looked at the rear spring shackle. Instead of a grease cup I noticed they had put on an oil cup. Maybe oil works just as well as grease, I don't know, but I assume they know what they're doing and I suppose all I need do is squirt a little oil in the cup now and then.

"I will say that the two valve tappets were quiet and I think they did fuss with the engine and carbureter mixture.

"But what get's me sore is to think that I was lead to believe all the little details I had asked them to fix were attended to. I don't want the earth, but it does seem to me that a door ought to close in a car and a hood ought to stay in place. Why should the bird that buys the car have to rebuilt it?"

And so our friend went on.

The whole thing means that somewhere in that organization which sold him the Runwell car, someone bungled.

The first mistake was made when the car owner brought his car in and no notation was made on the proper blank as to what that car needed. What should have been done is this:

Someone, preferably the service manager or a competent inspector, should have taken out the car with the owner sitting alongside of him and given it a road test to determine what was necessary. These items should have been jotted down on an inspection report and in addition those items which the owner knew about, like the rear door, the hood, etc., added.

BUYER SHOULD HAVE FIRST CONSIDERATION

Then after all of the work had been performed, the items could have been checked off by the inspector and the owner handed a duplicate copy to show him exactly what had been done. If an unchecked item occurs, it can be discussed then and there, instead of cussed later on by the irate owner.

Everyone connected with the automotive industry, whether maker or dealer must bear in mind that the car buyer must come first in any transaction. The house policy of one of the country's largest and finest retail stores for a long time has been "The Customer Is Always Right." Most of our service stations would do well to adopt this with the words meal ticket in place of customer. After all, what is the customer, but your meal ticket. If he doesn't come near you, you don't eat.

The foregoing experience of the man who bought a Runwell is typical of what is going on all over the country many times a day. This lack of definite understanding between the customer and the house has been one of the service evils with us for many years.

It is but a simple matter to install a system whereby someone checks up on what a car needs, and by all means get someone who will be polite enough to let the customer talk. The customer drives that particular car more than any man in your service station and he has a right to explain to those from whom he bought the car the nature of any troubles he might have encountered. The men in the service station might know how a car ought to operate, but that's not saying they know how any of their customers' cars are operating.

If You Doubt the Value of the Flat Rate Plan of Selling Service Read This

IT took a tailor to teach one garage proprietor at Tiffin, O., the advantages of the flat-rate or estimating system of handling service charges.

It seems that the tailor has had considerable trouble with his automobile this summer. And his opportunity came when the garage man entered his shop to have a button sewed on a coat.

The tailor did the work and then handed the garage man this bill:

To sew on button	13c
Thread	3c
Button	6c
Labor, one-fourth hour	30c
Removing old thread	7c
Labor, one-eighth hour	15c
Needle	2c
Beeswax	1c
Knotting Thread	2c
Labor, 10 minutes	20c
Total	99c

LISTEN TO CUSTOMERS' COMPLAINTS

If the customer starts to tell you all about his car, at least let him finish. Don't cut in with something like "Oh, well, we'll take care of it. We know the car, etc." When you consult a doctor he makes you sit down and tell him all about the way you feel. Then he reads between the lines and prescribes a remedy. And after all, what are service men but doctors for ill automobiles?

Car owners, collectively speaking, are still of the opinion that most service stations are first class robbers. If ever we are to put service on a better basis, it is this feeling which we must overcome. The car owner must be made to realize he is going to a legitimate business institution when he drives his car to a service station. He must be made to feel at ease. He must receive the same courtesies he is used to in a large department store, a drug store or a moving picture theater. He must not get a jolt when he comes to a service station.

It is gratifying to note that in the recent years the service station has come to the front, due largely to better business methods and a better general understanding between makers, dealers and owners. But a great deal of work remains to be done. Our service stations are not looked upon generally by the driving public as real business institutions. There are many excellent ones, of course, but the trouble is there are too many poor ones.

Probably one of the quickest ways to get our service institutions on a better basis in the minds of the public is the general adoption of the fixed price system. This has done more to build up service for those concerns which have installed it than any other single factor. When your customer knows to a dot what you are going to do to his car and knows exactly what it is going to cost him, there is little room left for anything to go wrong. And, if we will but keep our Mr. Carowner ever in mind as our meal ticket, many of the chaotic conditions of service will right themselves.

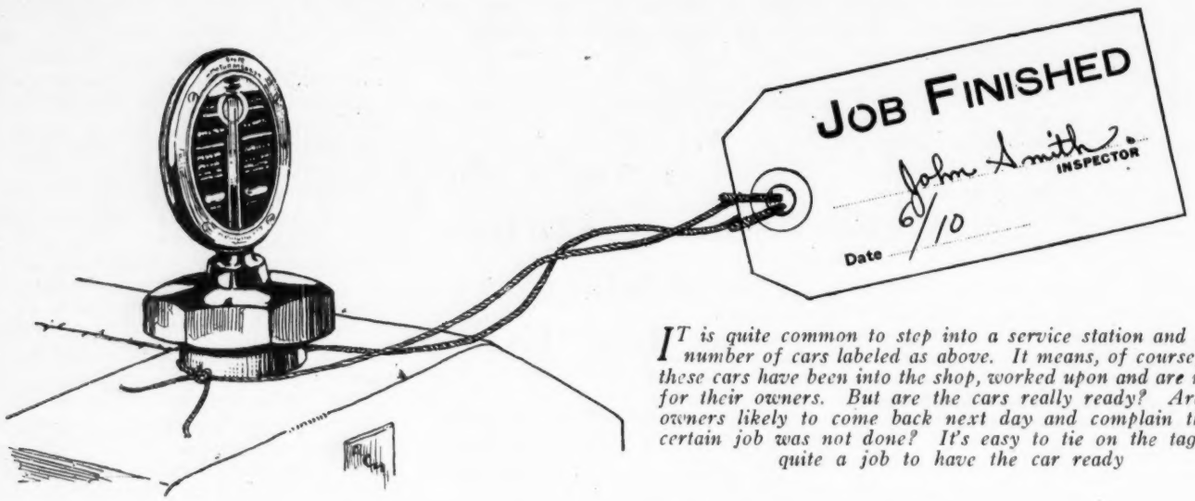
GOODYEAR MAKES REDUCTIONS

Akron, O., June 18—The Goodyear Tire and Rubber Co. today announced sweeping price reductions on all motor truck tires, including both solids and pneumatics, and also the cushion truck tires, effective June 20. The Goodyear price reductions will average 23½ per cent on all six, seven and eight-inch cord pneumatic truck tires, including the sizes most generally used on trucks and buses. The reduction on S V solid tires will average 12 per cent and on cushion tires 10 per cent. Prices on pneumatic tires for trucks over eight-inch and on the new all weather tread solid tires for trucks will also be reduced to some extent.

Goodyear is the first major tire company in the United States to announce price reductions on truck tires. Practically all companies have reduced automobile tire prices but none outside of Goodyear, so far have revised prices on pneumatic and solid motor truck tires. These reductions will complete the stabilization of tire prices through the entire Goodyear line, following the reduction in prices on all kinds of automobile casings and tubes announced last month.

Doing the Unusual to Sell Service

Here Is a Concern Which Has Equipped Itself for the Right Kind of Business and Has Risen Above the Petty Vexations to Bigger Things



IT is quite common to step into a service station and see a number of cars labeled as above. It means, of course, that these cars have been into the shop, worked upon and are ready for their owners. But are the cars really ready? Are the owners likely to come back next day and complain that a certain job was not done? It's easy to tie on the tag, but quite a job to have the car ready

AT the top of this page we show part of a car to which has been fastened a tag labeled "Job Finished," which in plain English means that this car has been in the shop, the necessary work done, and that the car is ready for the owner to drive away. All of which is all right, if we are sure that what the tag says is true.

Too often a car thus labeled comes back a second and third time and a checking up shows that certain operations may have been carelessly done or the inspection was not thorough enough. It is common to hear owners say "I had my car at Blank's service station and when I got it back I found they didn't do half of the things I wanted done." And yet maybe his car was labeled "Job Finished."

One St. Louis concern, the Hudson-Frampton Motor Car Co. realizing that such conditions were more or less common in the world of automotive service, decided when it built its new $225,000 service station to stamp out this evil. The right house policy, the best equipment, good business methods, good personnel and similar things have gone into the make-up of this establishment in order to win and hold its customers. Here are some of the facts.

The repair department, necessitating an area of 30,000 sq. ft., is equipped with the latest devices for rendering intelligent and prompt service. Individual repair benches with complete tools and equipment are located in each mechanic's repair stall.

LARGE STOCK OF PARTS CARRIED

That immediate replacement may be accomplished, an enormous stock of parts is maintained at all times. The Hudson parts stock inventories at more than $60,000 and the Essex parts in excess of $40,000. In addition to the stock parts a complete line of automotive equipment is maintained, seasonable equipment being available at all times, such as winter tops, special oils and greases, windshield wings, skid chains, tires, tire covers, microscopes, cutouts, and snubbers.

AUTOMOBILE LAUNDRY POPULAR

Another modern device characteristic of the station is an automobile laundry with a capacity of cleaning 70 cars a day. A machine can be washed and polished with the greatest degree of efficiency in thirty minutes by means of a water system under air pressure. A vacuum and chemical cleaning department is located in the laundry where the interior of the car is renovated in a most sanitary and thorough method. The minimizing of the time factor in cleaning automobiles has tended greatly toward the popularization of the Hudson-Frampton station and there is seldom a day that the laundry is not running to capacity and turning out its routine of 70 cleaned automobiles.

For the purpose of making patrons comfortable, a rest room is provided for those who desire to wait while their

Some of the Things Which Have Helped This Concern

1—The repair department is equipped with the most up-to-date machinery and tools for rendering intelligent service.

2—Individual repair benches with complete tool layout are located in each mechanic's repair stall.

3—Minimizing the time factor in cleaning automobiles has tended towards popularization of the company's automobile laundry.

4—Reception rooms for men and women.

5—A lubrication rack which lifts the car on a steel runway above which an air hoist lifts the car to loosen the spring leaves in such a manner as to permit quick oiling.

6—The customer learns before he leaves the service station just what the repair job is going to cost.

7—Every car before it leaves the service station is tested by an inspector and cannot be delivered to the owner until the inspector has placed the proper tag upon it which releases the car.

8—There are separate rest rooms for white and colored employees. The building is equipped with lockers and a battery of shower baths for the mechanics.

cars are cleaned or repaired. A reception room for both men and women is maintained with telephone, lavatory, writing desk and other minor conveniences. It is the first service plant to seek this course in this city.

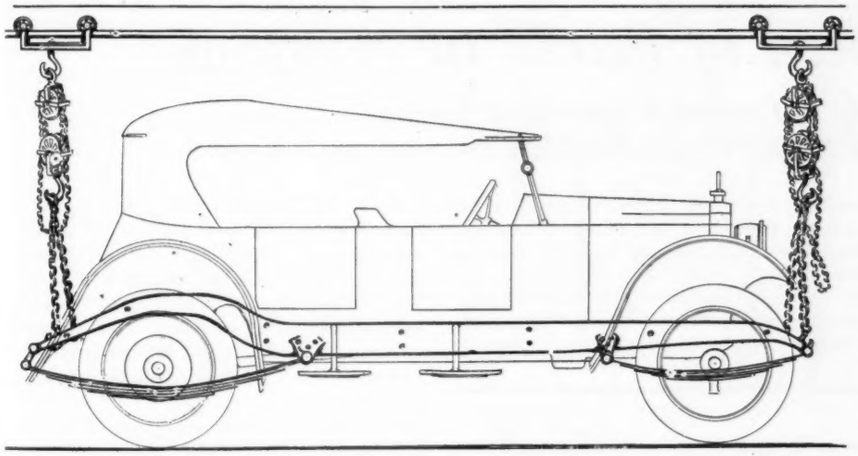
The gratis service rendered Hudson and Essex owners has always been an asset to the company, according to H. R. Henry, manager. "We find that we create a good will that money alone can not obtain by frequently inspecting cars brought to us, though such inspection was not requested, by placing air in the tires, by oiling parts easily approached, and like services. *We find that by taking the best care of both Hudson and Essex cars in an institution such as we have created, we not only satisfy the owners of the cars, but build a staunch reputation for these two makes of automobiles, thus advancing the possibility of selling the prospect one of either of these cars.*"

Among the other latest mechanical devices of the station is a lubrication rack which lifts the car on a steel runway, above which air-hoists raise the car in such a manner that the springs are loosened, thus permitting oiling and greasing in the most inaccessible parts, under pressure of the air oiling system. In this way perfect lubrication is absolutely obtained.

REPORT TO CUSTOMER AFTER CAR EXAMINATION

The facilities for examing cars for repair are very complete. Testing racks and routes have been planned in such a way that the examination of each car will absolutely determine repairs or adjustments needed, so that an intelligent report as to what will be necessary to put the car in order may be given the customer at the time the car is brought to the service station. By this efficiency plan a customer learns shortly after delivering his machine, exactly what the cost of repair is going to be. *This avoids the risk often assumed by car owners who leave their machines for repairs expecting to pay an approximate price within their own reason, and later learning that the cost of the readjustment is far above the figure they set in their own minds.*

When it is found after a close inspection that it is absolutely necessary to install a part which was not figured on in the estimate rendered the customer, he is notified before any work is conducted on the automobile. Thus all the differences which might result from arbitrarily installing the part are avoided. This system, Mr. Henry pointed out, is working to a decided advantage. It is causing the public to realize that all repair stations are not of the so-called "hold-up and skin-game" variety, and is bringing much additional business the Hudson-Frampton way.



Frequently a service operation can be done in a few minutes, but it takes a long time to get to it. This often is the case with spring leaf lubrication. This St. Louis concern has built up a device by which the car's weight is taken off the springs, the leaves of the latter made to separate. This means cutting down the time for spring lubrication and conserves the energy of the mechanics

At the completion of any operation each car is thoroughly tested by expert inspectors—not working mechanics—before it is permitted to leave the department.

The maximum capacity of the service station is estimated at one hundred cars per day and immediate service is the prime aim.

All air pressure comes from an enormous compression plant installed, and in addition to cleaning and lubricating, the air pressure is utilized in 15 other distinct operation. Heating of the entire plant is by means of the vacuum and blower system with facilities for ventilation and governing apparatus that will at all times maintain a uniform heat.

"A satisfied employee is half of your business" is the motto accepted by the management of this unique station, and in this respect unusual arrangements have been provided for the comfort and care of those who work there. There are separate rest rooms for the white and negro employees, thus avoiding any friction which might arise from this source. Separate steel lockers and lavatory rooms are also a part of the equipment in addition to a large battery of shower baths available for mechanics.

The station also boasts a display room, despite the fact that the company maintains its sales and display rooms for both new and reconstructed automobiles at its downtown location.

Buckeye State Registration Shows Larger New Car Sales

Columbus, Ohio, June 18—State Registrar of automobiles estimates that the total revenues derived from the registration of motor vehicles, motorcycles, sidecars and trailers during the year 1921 will reach $7,000,000. The licensing department up to June 18 has passed the highest number of registrations in any previous year and is still going strong. Up to that date a total of 565,000 passenger automobiles were registered which is 30,000 more than the entire number issued in 1920. The department has also issued 92,000 sets of plates for trucks which is 9,000 in excess of the total of last year.

Registrar Snow estimates that the total number of passenger cars will be in excess of 600,000 and that at least 100,000 trucks will be licensed. In addition he believes that there will be 3,500 dealers and manufacturers' licenses, 4,000 electrics, 24,000 motorcycles, 3,000 cars owned by the state or its political subdivisions, 4,500 trailers, 50,000 transfers of tags from one car to another and 40,000 duplicates and certified copies issued.

The Atwood bill, requiring the owners to have bills of sale at all times becomes effective August 14 and the Hopley bill requiring all owners to file application blanks for registration in duplication becomes effective January 1, 1922. The Pence bill providing for definite lighting of cars and limiting the use of spot lights becomes effective September 7.

MINNEAPOLIS STARTS NEW ROW

Minneapolis, June 18—Opening of a new bridge across the Minnesota river on Lyndale avenue has caused a new automobile row to be opened on that avenue in this city. This is due directly to the fact that this bridge is expected to divert trade of $7,000,000 a year from contiguous territory into the city. The North Star Motor Co. has bought a corner at Lincoln and Lyndale. Three other motor firms have taken options on the avenue to build in the next seven months. The Johnson Automotive Company started a $90,000 building June 13.

MARTIN-PARRY REDUCES PRICES

Indianapolis, June 18—The Martin-Parry Corp., manufacturers of light commercial bodies, with plants at York, Pennsylvania and Indianapolis, have made a second reduction in the prices of their commercial and farm bodies for Fords. This reduction amounts to as much as 10 per cent on certain models, and became effective June 20.

Getting Down to Earth in Aviation

Problem Now Is to Establish Standard Types of Powerplants for Each Service—Sport, Commercial and Mail

ALL authorities are agreed that if automobile transportation is ever to be superceded it will be by airplanes. While, from the present outlook, this generation will never see extensive commercial and pleasure flying, it is very probable that the second or third generation, and that even in this generation, there will be considerable sport flying and not a little commercial and mail use of the airplane.

Even this relatively small amount of usage of the plane for commercial and sport use is going to mean business for distributors of air equipment and accessories and it therefore is essential that the automobile dealer keep in touch with these developments as they arise in order that he may be informed on just what the status of the business is.

In the opinion of engineers who are in the airplane business there are certain requirements of aeronautic powerplant developments which will have to be met. The end of the war left us with very highly developed military powerplants, capable of enabling man to outdo the performance of birds in flight, as far at least as speed is concerned.

This accomplishment was principally due to the necessities of the war. As a result of war requirements, designers strove increasingly to make lighter and more powerful engines. The limit of the power available from a single sylinder caused more and more cylinders to be added, until at the close of the war, engines were being developed with as many as twenty-four.

The problem which now confronts the industry is one of establishing standard types for the powerplants required by each service, and setting up reasonable power requirements for each unit. For each service, factors must be developed to permit the making of correct comparisons of the performance of different engines. At the present time, aeronautical engineers unconsciously consider that an engine must weigh less than 2 lbs. per horsepower, and that the fuel consumption is satisfactory if it is in the neighborhood of .5 lbs. per hp. hr. Such an engine rarely lasts more than 50 hours without an overhaul.

Aeronautical Requirements

CHEAP and economical powerplants are the big necessity for further airplane developments. Commercial engines should run at least 16,000 miles without a complete overhaul and have a fuel consumption of .40 lbs per brake horsepower hour. These constants contrast sharply with those for military requirements. At the present time it is quite unconsciously agreed that an airplane engine should weigh less than 2 lbs. per horepower and that the fuel consumption is satisfactory if in the neighborhood of .5 lb. per brake horsepower hour. In the past durability has been sacrificed for light weight per horsepower.

In the past, durability has been sacrificed for light weight per horsepower. The weight factor per engine for real durability and long life must be at least 3½ lbs. per hp. Commercial engines should run at least 16,000 miles without a top overhaul and have a fuel combustion of .40 lbs. per brake hp. hr. These constants contrast sharply with those for military requirements.

The maximum compression ratio from which a gain of power can be secured is 7 to 1. So far, the size of the cylinder does not seem to limit the use of such a compression. About 5¼ to 1 it is desirable to use some anti-knock substance such as benzol if it is necessary to operate the engine on the ground under full power. Without dope, it is possible to secure with a 7 to 1 compression ratio a 130 lbs. per sq. in. mean effective pressure, and with dope as high as 145 lbs. per sq. in. This compares very favorably with the average 90 to 100 lbs. per sq. in. secured with the ordinary automobile engine.

G. J. Mead and L. E. Pierce, engineers of the Wright Aeronautical Corp. of Paterson, N. J., in a paper before the Society of Automotive Engineers at the meeting at West Baden, brought these facts to light. They stated that we have not reached the limiting size for any type of engine as regards the maximum power available. No increase in engine performance can be expected unless new materials of construction, new fuels or new cycles of operation are made available. Continued development will refine the practices of the art and result in bettering the life of the engine and the service it renders, rather than its performance. Therefore, increased airplane performance must be secured mainly by improvement in airplane design.

Great advance seems to be possible in this direction. One reason for the tremendous powerplants available for airplanes has been the effort to secure performance by brute strength. Absurdities can soon be reached if this trend of development continues. It is certainly worth while to consider what can be done with a reasonable-sized power unit by altering the design of the airplane. In other words, cheap, economical powerplants are the big necessity for further airplane developments.

Turbulence—What It Is and How It Affects the Operation of An Engine

Highly Desirable That Gases Be in a Violent Stage of Agitation at Instant of Ignition

EVERY time we stir up the sugar in a cup of coffee or tea we have a fine example of what our automotive engineers call turbulence. Turbulence simply means stirring or agitating. We stir the sugar to sweeten the coffee or tea in as short a time as possible. It would take quite a while to get the sugar and cream mixed completely with the coffee if we just added them and let the mixture stand, but a few whirls of the spoon and we get the desired results. It is quite the same problem in an internal combustion engine.

It is a well known fact that the earlier in the firing stroke the gases are entirely consumed, the more efficient the engine will be. Engineers refer to this in terms of mean effective pressure. In other words, the mean effective pressure of an engine is increased by early, complete combustion. When an engine has a high mean effective pressure, it is more economical and more powerful for its dimensions.

TURBULENCE SPEEDS COMBUSTION

One of the methods utilized to speed up combustion is turbulence. Turbulence in a gasoline engine is utilized to accelerate the rate of flame propagation. In other words, by throwing the masses of burning gas throughout the charge, it starts a number of new combustion points so that the rapidity of combustion is far greater than would be the case with a quiescent gas ignited only from the spark plugs.

At the convention of the Society of Automotive Engineers at West Baden recently, the subject of turbulence formed one of the most important points of discussion. H. L. Horning, of the Waukesha Engine Co., presented a paper on the subject, which was discussed by engineers and commented upon as a subject which, in the demand for increased fuel economy, will receive more and more attention.

RAPID FLAME PROPAGATION NEEDED

An examination of a large number of flame photographs indicates that there are four phases of velocity in the propagation of flame through a tube. The first phase is known as the phase of first acceleration; the second is one of uniform velocity; the third is that of second acceleration, and the fourth is that of a high uniform rate, known as detonation. The first phase represents a condition which, if it were possible to continue throughout the entire mixture, would result in the highest efficiency in flame propagation. In this phase the flame is blue. In the second the flame becomes green. In the third and fourth phases the liberation of energy is so rapid that incandescence of some of the carbon particles occurs and rapid loss by direct radiation takes place.

The cup of coffee above illustrates the theory of turbulence. You stir up the sugar and cream to get it mixed with the coffee as soon as possible. Turbulence in the combustion chamber of an engine is nothing more than stirring or agitation. It is in effect a cyclonic condition of the gas at the instant of ignition

With this knowledge in mind, engineers are now trying to design engines in which the rate of flame propagation will be in accordance with the first phase; that is, the blue flame phase is desired. It is not possible to work entirely within this phase, but the velocity must not exceed that of the end of the second phase and, consequently, a maximum area of flame in order to increase the volume consumed in a given time is desired.

In other words, the design of a combustion chamber permitting rapid spread of the flame crest, developing at each successive advance an increasing area of contact with the unburned mixture is what is desired. Turbulence is the means used to secure this result.

Turbulence is produced by two fundamental methods. The first and most common method is by means of intake gas velocity. There is a fundamental defect in this method inasmuch as it depends on a high gas velocity which means relatively low volumetric efficiency, or, in simple language, a reduced amount of charge taken in per stroke.

PRODUCING TURBULENCE BY PISTON COMPRESSION

The second method of producing turbulence is by piston compression and this is the most effective known for a given speed of engine. There is still another way in which turbulence can be produced, namely, by forcing the contents of the cylinder at high velocity through a venturi of small area into the combustion chamber on the compression stroke.

Prominent engineers discussing the subject of turbulence state that both L-head and I-head engines have been built with practically equal results. In fact, with turbulence, the advantage is on the side of the L-head engine. In one particular case, owing to better turbulence, the spark advance in the L-head engine did not need to exceed 25 deg., while in the I-head engine it had to be carried up to 65 deg. with two spark plugs.

One objection to turbulence brought forward is that the presence of exhaust gases in the combustion chamber has a marked effect on combustion. Increasing the turbulence mixes the exhaust gas with the incoming charge and allows it to cut down the efficiency, while if the inertia exhaust gas can be kept stratified on top of the piston and remain at rest, conditions are better.

Good turbulence might be described as a cyclonic effect taking place within the combustion chamber at the instant of ignition. The gases should have a whirling motion and move very fast. Any pockets which are not correctly designed will tend to dampen the cyclonic or surging action.

It is probably true that at 1/32-in. from the combustion chamber surface the gases hardly are in a state of motion. At 1/16-in. the gases are moving rapidly and at 3/32-in. the gases violently surge. The stratified portion of the mixture closest to the surface is probably very lean and a spark ignited in this portion of the mixture is not conducive toward rapid propagation. At the outward position when the gases move very swiftly there is a richer mixture, and if ignited at this point, the flame propagation is much faster

Dissatisfied Customers Turn Away Business

Dig Them Out—It May Have Been a Trifling Reason But Their Complaints Are Often Exaggerated in the Telling to Other Car Owners

FOLLOW up service work and the purchaser of a new car to make sure that he is satisfied with the service work you did or that the car is performing as it should.

One disgruntled customer can do more harm to your business than several boosters can do good. Even if the customer is entirely satisfied with his purchase or the repairs made it will certainly engender a more kindly feeling toward you for the interest you have shown in his welfare and keep him coming to you with all his future business. The cards below are samples of what a Ford dealer is doing to build up that valuable asset—good will. Any dealer can write them; they need not be models of literary style; better still if they are plain human inquiries showing an interest in your customer's past and future patronage and they will appreciate them as such.

YOUR new Ford car was delivered to you one week ago today. You have doubtless been "trying it out" and it is beginning to "find itself." Naturally, you are anxious to obtain the largest possible amount of service out of your car with the smallest amount of worry and expense to yourself. We are equally anxious that you should get such results. Do not forget us—we have not forgotten you. We are here to serve you—to see that your Ford car shall mean to you everything within reason that its wonderful reputation has led you to expect. We advise you to drive frequently to our Service Station, and permit us to inspect your car and inform you regarding its proper maintenance. All inspections are free of charge, and we stand ready to back up the guarantee of the Ford Motor Company without reservation, granting you free adjustments and repairs that come under its scope. We are determined that you shall be entirely satisfied—nothing less.

We wish to thank you for your valued order and trust that you will allow us to continue to serve you.

MELDRUM MOTOR CORPORATION,
Authorized Ford Agency,
1081 MAIN STREET, BUFFALO, NEW YORK

The Meldrum company believes in keeping in close touch with its customers. Just a week after a new car leaves its establishment it mails to its owners a postal card like the above

WE repaired your Ford car at our Service Station and delivered it to you yesterday.

We wish to remind you again that perfect Service means complete satisfaction. We are here to see that you get perfect Service.

Will you help us to serve you well by telling us immediately if our work proves to be unsatisfactory in the slightest degree?

MELDRUM MOTOR CORPORATION
A. S. MELDRUM, Manager

The next day after a car leaves this company's automobile hospital, no matter how many visits to the repair shop it may have made, the mail carrier delivers to its owner a post card on which the above is printed

WE repaired your Ford car three days ago. You have since had an opportunity to try it out and we wish to inquire whether you have found our work entirely satisfactory. We wish to assure you that we are determined to give nothing but absolutely first-class service to all Ford owners who grant us the opportunity to serve them. We trust that the work just completed for you was in this class—absolutely satisfactory. If such was not the case—if you have been disappointed, even in the slightest degree, you will confer a favor by advising our Manager at your earliest convenience.

We wish to thank you heartily for your patronage. Please do not forget us—we shall not forget you.

MELDRUM MOTOR CORPORATION,
Authorized Ford Agency,
1081 MAIN STREET, BUFFALO, NEW YORK

Three days after a man takes his car from its shop following the first repair job on the car, the owner gets the post card reproduced above

WE were particularly pleased to find yesterday that you permitted us to repair your Ford car, so that it may continue to serve your needs efficiently.

We are pleased because we believe this means that you have found our service to be satisfactory. We are confident that you will find our latest work to be of the same sort. We aim to make the word "Service" mean to you exactly what you expect it to mean. If our variety of service does not stand that high in your estimation we want you to tell us at your first opportunity. If there are any defects in the work we have done for you, our Manager will welcome the chance to make good.

Drive to our Service Station frequently. We make no charge for inspections and minor adjustments, and many times we can help you to avoid worry and expense by catching small troubles before they become serious.

MELDRUM MOTOR CORPORATION,
Authorized Ford Agency,
1081 MAIN STREET, BUFFALO, NEW YORK

The day after he takes his car home following its second visit to the repair shop he receives a post card reading like this

YOUR Ford car was delivered to you one week ago today. You have doubtless been "trying it out" and have become pretty well acquainted with your purchase. We feel sure that you have found it to be all that was represented to you, and we want you to know that we are anxious that you shall obtain the largest amount of service from it that is possible.

Do not forget us—we have not forgotten you. We are here to serve you—to see that your Ford car shall mean to you everything within reason that its wonderful reputation has led you to expect.

We advise you to drive frequently to our Service Station, and permit us to inspect your car and inform you regarding its proper maintenance. All inspections are free of charge and we stand ready to make good if it should happen that the car is not all that we represented it to be. We are determined that you shall be entirely satisfied—nothing less.

We wish to thank you for your valued order and trust that you will allow us to continue to serve you.

MELDRUM MOTOR CORPORATION,
Authorized Ford Agency,
1081 MAIN STREET, BUFFALO, NEW YORK

Seven days after the sale of every used car the purchaser receives a post card reading like this

KEEP THIS CARD

It entitles you to one free wash and polish for your Ford car. Just hand it to Mr. Abbott, our Service Manager, at our Service Office, Main and St. Paul Streets.

While your car is being washed Mr. Abbott will explain our New Service for Ford Owners and show you our plant.

WE ARE SUPPLYING TO FORD OWNERS A BRAND NEW FORM OF SERVICE

We want you to know all about it because we are sure you will never again be satisfied with any other kind.

You Will be More Than Pleased

MELDRUM MOTOR CORPORATION
Authorized Ford Agency
1081 Main Street BUFFALO Tupper 6460

Another card used by the Meldrum Motor Corp. and which has shown good results

DILUTION of CRANKCASE OIL

Thinning of Lubricant Not Always Due to Engine Operations — Unbalanced Condition of Fuel, Engines and Oil Exists

FUELS of the present and future are becoming gradually heavier and less volatile. By the use of these heavy fuels in engines designed for the burning of lighter and more volatile fuels, we are confronted with an unbalanced condition of the fuel, the engine and the lubricating oil. The condition existed before, but due to the fact that the fuels in use did not contain so many heavy ends, the thinning of the lubricating oil was not so noticeable or troublesome.

Dilution of the crankcase oil of an engine operating on these heavy fuels takes place through three phases. In the first instance, the vapors escaping past the piston rings during the compression stroke recondense in the crankcase; secondly, the film of lubricating oil on the cylinder walls, which has become diluted with the unvaporized fuel during the admission and compression strokes, drains back into the crankcase; and thirdly, the lubricating oil is decomposed or "cracked" as it is thrown against the underside of the piston.

OTHER CAUSES OF DILUTION

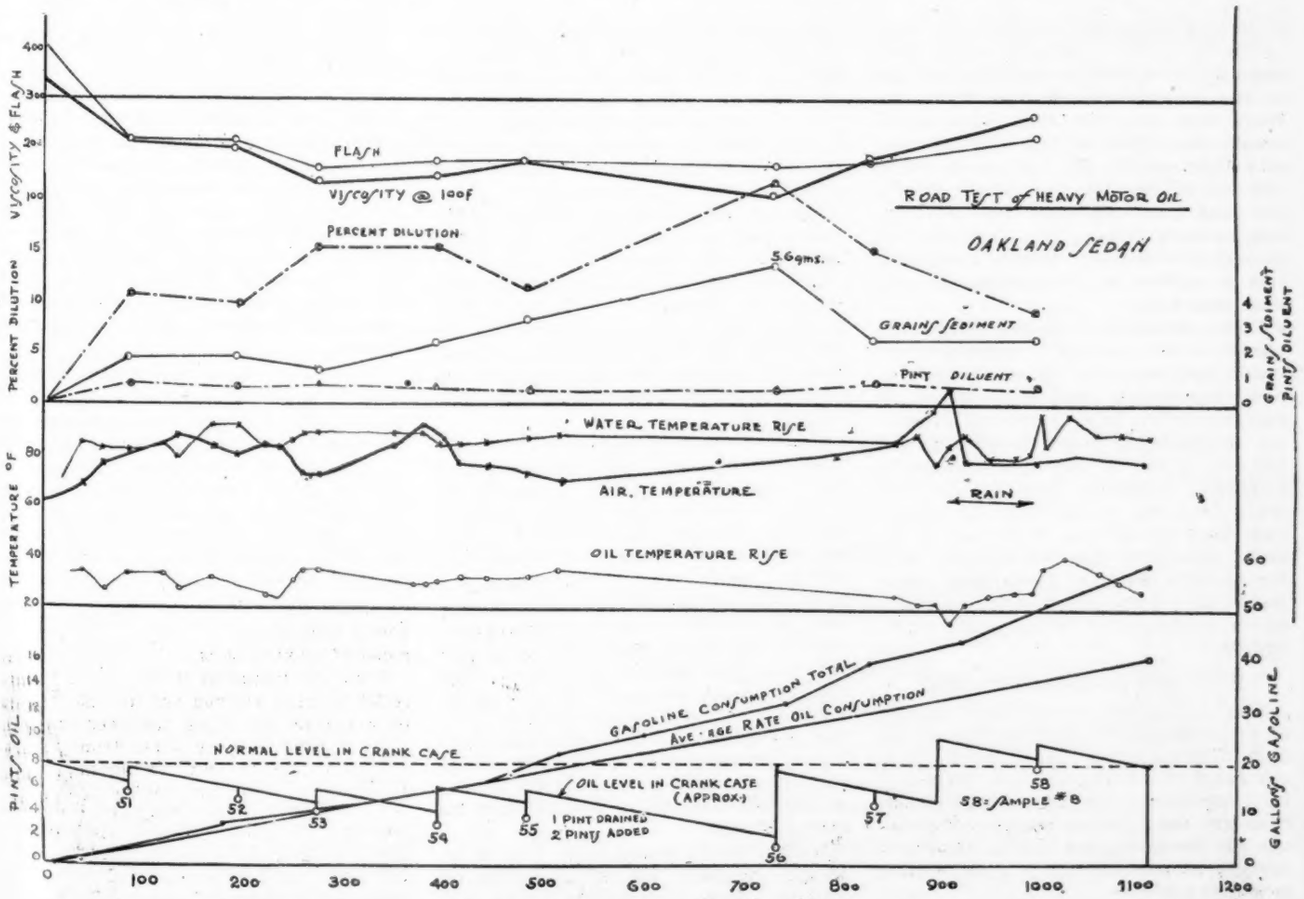
In some cases dilution of the lubricating oil is due to conditions other than the operation of the engines, as, for instance, when the crankcase is drained it is sometimes washed with kerosene. It is often impossible to drain all the kerosene which is caught in pockets and behind baffles, so that dilution often takes place in the oil before the engine is operated.

In order that the changes noted above may be more clearly portrayed the accompanying chart is given. This graph is made from readings and samples taken from a popular make of car operated over 1,100 miles, and is typical of the operating conditions of the engine and the usual procedure of the motorist.

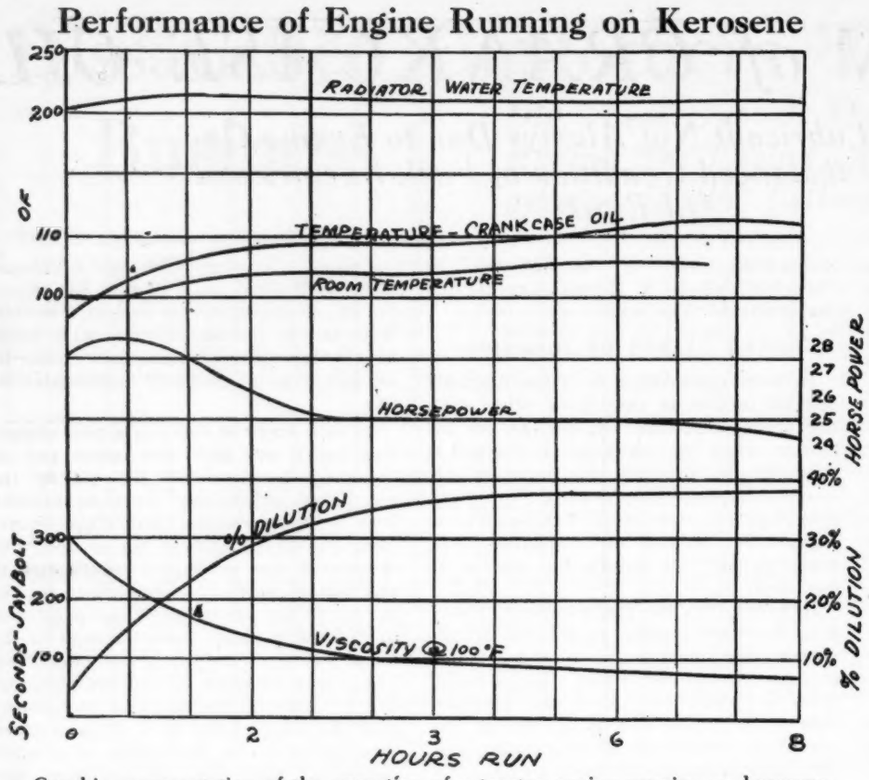
It will be seen that the curves are laid out on the basis of the distance covered in miles. Starting with the crankcase filled with eight pints of new heavy motor oil, as shown by the indicated normal level line of the oil, samples were taken at regular intervals and new make-up oil added as graphically represented as S1.

At this stage of the run a pint sample was taken out and two pints put in, bringing the level of the oil in the crankcase practically back to normal. The conditions under which the crankcase oil was operating up to the time sample S1 was taken are represented in the middle section to the chart by the curves of the atmospheric temperatures, of the water in the radiator, and of the temperature of the oil in the crankcase. The upper division of the graph shows the analysis of the samples and shows how the body of the new oil is reduced in viscosity as the percentage of dilution increases; also how the sediment, ash and flash point change through operation.

The results of this road test show that



This chart is made from readings and samples taken from one of the popular makes of cars operated over 1100 miles and is typical of operating conditions



Graphic representation of the operation of a tractor engine running on kerosene. Note that dilution plays an important part beyond a certain limit; for first hour of operation oil was not materially affected by leakage of fuel

it is very dangerous to allow the level of the oil in the crankcase to get down too low, for it will be readily seen that at the time sample S6 was drawn out there were only two pints of oil in the crank case. This oil had only the body of a light spindle oil, being only 105 at 100 deg. F. (Saybolt Universal) whereas the flash point was only that of kerosene, namely 165 deg. F. Then, too, the amount of sediment, which is a combination of oxidized oil, free carbon and road dust, was high.

Under conditions represented by sample S6, in the majority of cases bearings would have seized or the cylinder walls and rings would have been subject to excessive wear, in all probability resulting in scored cylinders because of the thinness of the oil and its contaminated condition. Motorists often get the mistaken idea that by allowing the crankcase level to get way down, as in the above case, it is possible to bring back the characteristics of lubricating qualities of the crankcase oil by adding make-up oil, as illustrated by the points S6, S7 and S8.

WHY NOT A "DILUTOMETER"

This is not true as the total amount of sediment is still there, as well as the high dilution, which undesirable features are not found in the new oil. It should be remembered that the actual conditions are really worse because by draining out the laboratory samples the percentage of make-up oil is greater than in actual practice.

In order that we may see just how important a part dilution plays in the lubricating or frictional load placed on an engine, let us refer to the chart on page 16, which represents the operation of a tractor engine using kerosene as fuel. It will be noted that dilution plays a most serious part beyond a certain limit; for instance, for the first hour of operation the body of the oil was not materially affected by the leakage of the heavy ends of the fuel into the crankcase oil. But beyond this point there was a marked decrease in power output, which fell from 18 B. H. P. to 25.75 B. H. P. in less than seven hours. At this final point the dilution was 36 per cent, and the viscosity of the crankcase oil was reduced to the body of a very light spindle oil.

Knowing that dilution is detrimental and that there is a point beyond which this thinning out of the crankcase oil increases friction and causes excessive wear, the motorist should make it a point to either avail himself of "crankcase service" being offered by garages and filling stations, or else take it upon himself to give this feature special consideration. It is true that there is no definite rule that can be laid down other than to drain every 600 to 800 miles. However, research along this line is being carried on and there is a possibility that a "dilutometer" will be offered the motorist whereby he can test out the life of his crankcase oil as he now does his storage battery.

Such a device would allow him to determine whether his initial motor oil was too light to start with so that he was not geting the proper piston seal, or else would tell him that his fuel mixture was incorrect or that the grade of fuel he was using accentuated dilution. Factors which enter into this dilution problem are so numerous that the present stated period of draining the crankcase does not remedy the situation. In draining the oil at predetermined periods, it is discovered either that the oil is past the point of suitability, or that it still contains sufficient body to properly lubricate the ending and, therefore, should not be thrown away.

Much has been said about methods of overcoming dilution. However, as the problem is really twofold—(1) affecting the ten million automotive engines already in operation, which cannot be redesigned, and (2) the future production of automobile, truck and tractor engines—a preventive is not so essential for the present as some means for automatically extracting the dilution from the crankcase oil during the operation of the engine. This may be accomplished by the use of an apparatus now being developed, which takes the oil from the crankcase and draws it by means of the intake manifold vacuum through a stove heated by the exhaust gases.

From the stove the oil goes into a purifier, where the heavy ends are drawn off and put back into the intake manifold and at the same time the oil is strained. By an automatic device the oil is returned by gravity at certain intervals. There is no question, as actual demonstrations have proved, that with such an apparatus the body of the lubricating oil can be maintained and the grit and road dust eliminated.

"ANTI-KNOCK" MATERIALS

The second class of development is in engine design and seems to be progressing largely through improvements in carburetion and increased compression pressures. The latter is more practical and is made possible through the use of so-called "anti-knock" materials, which are injected into the fuel instead of being mixed with the fuel, and which will soon be introduced on a commercial basis.

It has been found that with this "anti-knock" or aniline injection it is possible to not only increase the fuel economy materially but make a decided decrease in the amount of dilution. This is explained by the fact that with these higher compression pressures the temperatures are such that practically all of the heavy ends of the fuel are consumed instead of leaking back into the crankcase.

From the foregoing it will be seen that relief is being worked out for the motorist along various lines, the need for this relief becoming more acute from month to month. Yet the car, tractor and truck owner or driver must realize that until such a time as these designs or apparatus are perfected and made part of the engine, the burden rests squarely upon his shoulder. If he fails to heed the warning of giving proper attention to the condition of the oil in the crankcase, draining same when diluted beyond a reasonable factor of safety, he cannot expect continued operation or economy from the engine.

Institutional Advertising Will Help

Sell the Customer on the Exact Nature of Your Service Operations

SENDING out a series of service folders at regular intervals to its customers and prospects is one of the original activities of Robertson & Pearson, Ford dealers in Houston, Tex.

These folders, six in number, comprised one on special tune-up, front system overhaul, replacing transmission bands, cleaning out carbon and grinding in valves, rear axle overhaul, and engine and transmission overhaul.

Instead of merely sending out to its customers a letter or card stating that the concern was in a position to do good service work, with the old line of "efficient organization," "up-to-date machinery," etc., this company went several steps further and not only pointed out to its patrons the reasons why adjustments and repairs were necessary at times, but went into detail as to what the company does when it performs various service operations, giving them the exact cost.

For example a "tune-up" might under ordinary conditions mean most anything from simply cleaning a set of spark plugs to a dozen or more other operations. With this Texas company a "tune-up" takes in five definite operations. It does this for the benefit of its patrons who do not always know just what is meant by the term. In order to insure a first-class job of tuning the company has adopted the following schedule of operations:

First—All spark plugs are removed from engine, taken apart, thoroughly cleaned and inspected. Proven defective parts or porcelains are replaced. Plugs are then assembled, spark gaps properly spaced and plugs put back in engine. Wires leading from dash to plugs are then tested, and, if found broken or defective, are replaced.

Second—The commutator shell—commonly known as timer case—is removed, thoroughly cleaned and then inspected. If contact points show rough spots or are worn, a new case is provided. If the commutator brush is rough or shows signs of wear it is replaced. Commutator wires are gone over and if found to be oil soaked, insulation worn off or generally in poor shape, they are replaced by new ones. The spark advance and retard rod is adjusted. The second phase of the work is completed when commutator case and brush is oiled and ready for use.

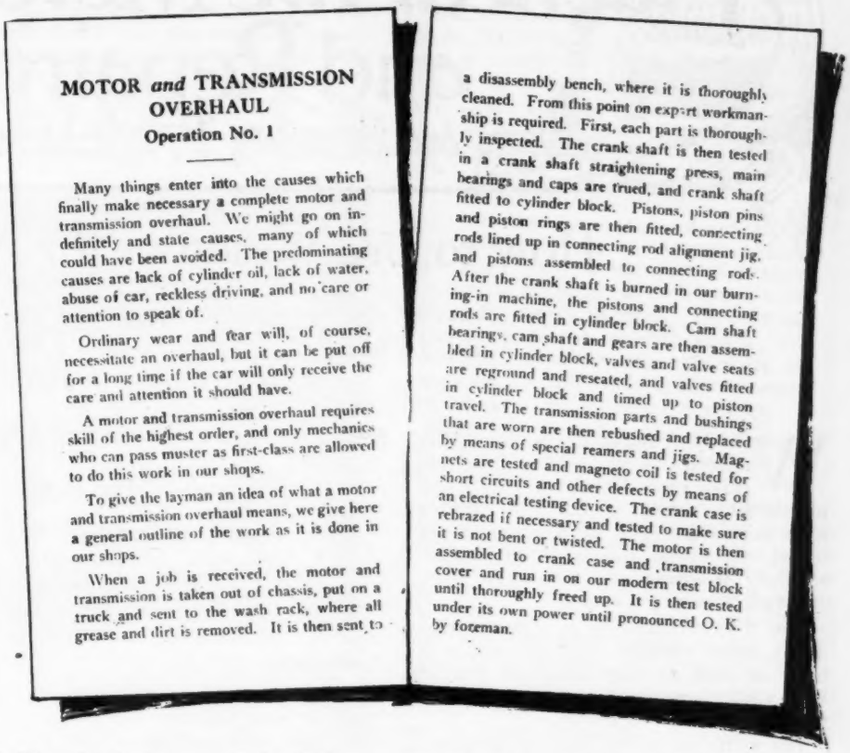
Third—Wiring on switch is examined for loose connections and possible defects. The four coils in coil box are tested in a coil unit tester and vibrator points are examined for worn or pitted contacts, which are removed if necessary and replaced with new ones.

Fourth—The magneto contact on transmission case is removed, cleaned and inspected. Foreign matter that may have collected at point of contact with magneto is removed and contact put back in place.

Fifth—Sediment bulb under gasoline tank and carbureter are drained to dispose of foreign matter and water that may have collected. Carbureter is then adjusted to meet the new conditions of the engine.

All this work will be done for a labor charge of $2, necessary parts extra.

Similarly the other folders go into detail explaining the operations.



MOTOR *and* TRANSMISSION OVERHAUL

Operation No. 1

Many things enter into the causes which finally make necessary a complete motor and transmission overhaul. We might go on indefinitely and state causes, many of which could have been avoided. The predominating causes are lack of cylinder oil, lack of water, abuse of car, reckless driving, and no care or attention to speak of.

Ordinary wear and tear will, of course, necessitate an overhaul, but it can be put off for a long time if the car will only receive the care and attention it should have.

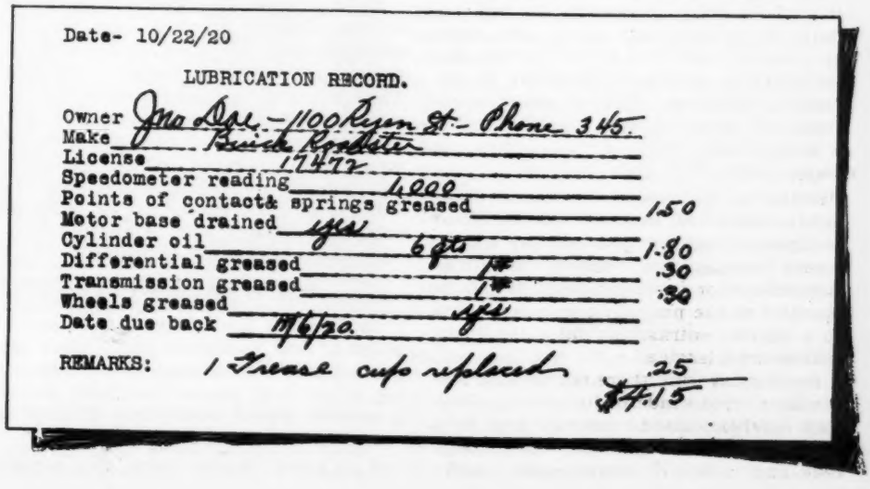
A motor and transmission overhaul requires skill of the highest order, and only mechanics who can pass muster as first-class are allowed to do this work in our shops.

To give the layman an idea of what a motor and transmission overhaul means, we give here a general outline of the work as it is done in our shops.

When a job is received, the motor and transmission is taken out of chassis, put on a truck and sent to the wash rack, where all grease and dirt is removed. It is then sent to a disassembly bench, where it is thoroughly cleaned. From this point on expert workmanship is required. First, each part is thoroughly inspected. The crank shaft is then tested in a crank shaft straightening press, main bearings and caps are trued, and crank shaft fitted to cylinder block. Pistons, piston pins and piston rings are then fitted, connecting rods lined up in connecting rod alignment jig, and pistons assembled to connecting rods. After the crank shaft is burned in our burning-in machine, the pistons and connecting rods are fitted in cylinder block. Cam shaft bearings, cam shaft and gears are then assembled in cylinder block, valves and valve seats are reground and reseated, and valves fitted in cylinder block and timed up to piston travel. The transmission parts and bushings that are worn are then rebushed and replaced by means of special reamers and jigs. Magnets are tested and magneto coil is tested for short circuits and other defects by means of an electrical testing device. The crank case is rebrazed if necessary and tested to make sure it is not bent or twisted. The motor is then assembled to crank case and transmission cover and run in on our modern test block until thoroughly freed up. It is then tested under its own power until pronounced O. K. by foreman.

Here is shown one of the folders sent out by the company. All of the work mentioned is done at a flat price of $30 which includes replacement of worn parts

Suggestion for Recording Car Lubrication



Date- 10/22/20

LUBRICATION RECORD.

Owner Jno Doe - 1100 Ryan St - Phone 345.
Make Buick Roadster
License 17477
Speedometer reading 14000
Points of contact & springs greased 1.50
Motor base drained yes
Cylinder oil 6 qts 1.80
Differential greased 1# .30
Transmission greased 1# .30
Wheels greased yes
Date due back 11/6/20.

REMARKS: 1 Grease cup replaced .25

$4.15

How to Use Windows for Advertising

Proper Kind of Background — *Use Colors Carefully*
First, Have a Plan — *Change Displays Often*
Make a "Class" Appeal

WINDOW displays are your best advertisements. Strive always to make them attractive. Well displayed merchandise is half sold. If this were not so the great department stores would not spend thousands of dollars on their windows and thousands more on experts to dress them.

The first requisite is a suitable window. Many windows that are not perhaps as good as they might be can be very easily converted and made attractive at a very small outlay.

The width of course, will be governed almost entirely by the width of the store. If the depth is insufficient it can be very easily increased by the simple expedient of extending the floor platform by means of a light wood framework. If it is necessary to increase the depth, bear in mind that sufficient space will be required to display a large tire "head-on." In other words, windows should be at least 4 ft. deep, and 5 ft. is ever so much better.

PROPER KIND OF BACKGROUND

If it is necessary to build the entire window, the floor should be approximately 12 in. higher that the pavement. This is about the right height to catch the eye. It is also high enough to prevent accidental damage to the glass.

Backgrounds may be good or bad and, if dark in color, generally are bad. A dark background acts much the same as a mirror and it is difficult to see the merchandise or display because of excessive reflection. This is easily overcome by choosing some light color for a background, such, for example, as cream, light blue, light buff, etc.

White is not so good because it so easily shows dust and dirt. An excellent background can be made of any of the patent composition boards such as Beaverboard, or Compoboard. If this is panelled and the paneling stripes painted in a slightly contrasting color the effect will be very pleasing.

For floor covering there is nothing better than a good grade of linoleum. This may be either a solid color or may be a neat design of black and white, dark blue and white, or brown and white squares. It is inadvisable to use any of those so-called highly decorative linoleums because they give the store a ginger-bready appearance. A black and white square design is very good because it gives just the necessary amount of contrast and, in addition, suggests cleanliness.

Good lighting is essential. People see window displays at night when they are through with the cares of the day and their minds are in a receptive condition. They are far more susceptible to suggestion than they are in the day. Any local electrical supply house will be glad to suggest a proper lighting plan and the fixtures can be easiy obtained at very little cost. But regardless of what the cost may be, any good window will return dividends on the investment.

FIRST, HAVE A PLAN

In dressing the window an important point is first to have a plan. High salaried window dressers employed by the big department stores invariably sketch a window layout before they attempt to complete the display.

A window should have one central idea. It should convey one suggestion and only one. This does not mean that only one kind of merchandise should be displayed at a time. It means that all the merchandise should be related—all of the same class. Avoid crowding; leave lots of space between the various objects displayed.

Expensive equipment for display purposes is not necessary. Any number of simple stands and other devices can be made quite easily and when carefully painted or perhaps covered with crepe-paper, will serve just as well as many of the high-priced nickel-plated devices that cost far more than they are worth.

One way to display a tire, for example, is to cut a "V" notch in each end of a rectangular wooden box so that the tire will rest in the "V's." Then cover the box with crepe-paper. A simple platform for the display of a single tire is very easily made and this too can be covered with crepe-paper and made to look like something that cost a lot more than it did.

USE COLORS CAREFULLY

Be very careful in using colors. Choose colors that harmonize. Don't use colors that clash, that grate on the nerves. Follow nature and you cannot go very far wrong because all the colors in nature harmonize.

Showing the purpose for which an article is used is always good merchandising and very considerably increases the power of suggestion conveyed by the window. For example, show a flap partly in and partly out of a tire, not by itself where people will wonder what it is and what it is for. Display the method of using tire putty to fill a break in the tread. Hundreds of such ideas will readily suggest themselves.

Every season has seasonable merchandise. Therefore, strive to have your windows hooked up to the seasons. Display skid-chains in the Fall and Winter but not in the Spring when they are seldom used. Arrange a display of tire accessories in the Spring because this is the time when car owners get their cars out and start to use them.

For Every Dealer

NO reader of MOTOR AGE who now operates or contemplates operating a tire business either as a separate business or as part of his service organization can afford to miss any part of this series.

The subjects explained are:

6—Window Displays
7—Salesroom and Office
8—Service Station Facilities
9—The Service Station
10—The Service Car and Its Equipment
11—The Repair Department
12—Equipping a Shop
13—Tube Repairing
14—Fabric Tire Repair

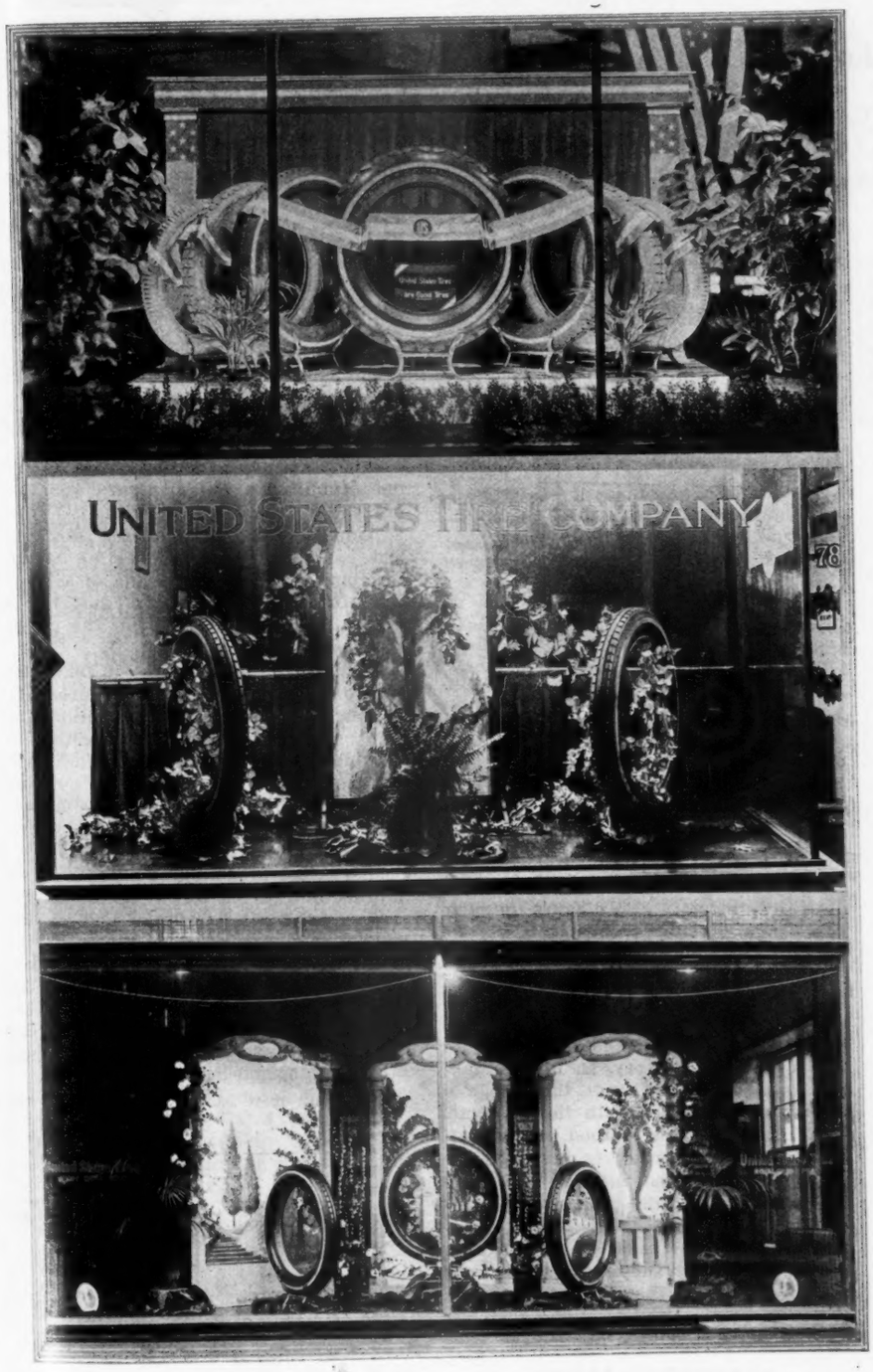
CHANGE DISPLAYS OFTEN

Change window displays often. You would not use the same sales talk to the same man over and over again. Your window is a silent sales talk. Window displays soon get "stale." The public is always looking for something new. For this reason a window display should not be allowed to remain in place for more than a week.

It is a mistake to imagine that truck tires, either solid or pneumatic, cannot be effectively built into a window display. Such merchandise is just as attractive to motor truck users as any other merchandise is to anyone else. Just because truck tires are very seldom displayed is no reason why this should not be done.

Changing displays often has another advantage. Merchandise left in a window soon becomes more or less shop-worn and therefore to a certain extent unsalable.

It is well occasionally to appeal to a definite class of car owners such, for example, as those who own small cars, like Fords, Maxwells, Overlands, etc. In this case it would be foolish to attempt to display 35 by 5 cord tires. Instead, show your small sizes, preferably your 30 by 3½ cord tires, and your small size blow-out patches and material of this kind.



Top—This window is well planned and nicely arranged but unless it had been designed with the thought of displaying a complete line it would have been too crowded

Middle—Be careful in using colors. Choose colors that harmonize. Follow nature and you cannot go very far wrong because all the colors in nature harmonize

Bottom—Window displays are your best advertisements; strive always to have them attractive. This rather elaborate display was made by a factory branch

MAKE A "CLASS" APPEAL

On the other hand, if you decide to appeal to car owners in the wealthier class, then show your large size cord tires. If a tire is supposed to be a black-tread tire, make sure it is black. Go over the tread portion with a cloth and a very small amount of glycerine. In short, increase the attractiveness of the merchandise to the greatest possible extent.

Displaying a process of manufacture and the various materials used is always good and inspires confidence. Such a display will always attract attention. You may not be able to display the process of manufacturing a tire but you can at least show all the various steps and material used in repair work. Few people have ever seen just how a repair is made and what goes into it. They live to learn, and therefore will stop and look at such a window.

Your don't want a window that will merely excite curiosity. You want one that will be attention-compelling and one which will at the same time make those who see it come into your store. That is the real test of the window.

A good window should: (1) attract attention; (2) give a definite idea of what you have for sale; (3) create a favorable impression; (4) create a desire for the goods.

Don't use your window to advertise other peoples' affairs. If the windows are valuable to other people they are certainly more valuable to you. Use few show-cards and have those few neatly lettered. Flowers or small trees on the streets attract no attention because they are in their natural environment. But put them in a window and they immediately stop the passerby.

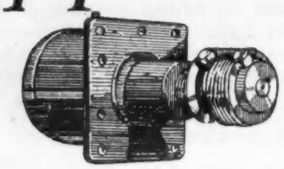
No good merchandiser need ever be told to keep his windows clean; but there are a lot of individuals in every business who are not good merchandisers.

There are a hundred and one things that can be done to attract attention and one of these is to put the entire vulcanizing equipment into the show window. Very few persons have ever seen the actual process of vulcanizing a tire and such a display is bound to create a lot of talk. Putting the tire stock in a rolling tire rack is the somewhat novel idea that has been adopted by one tire dealer.

NEXT WEEK

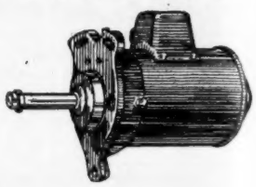
Salesroom and Office Will Be the Subject of Mr. McMinn's Article Next Week. Proper Use of Salesroom Is a Most Effective Means of Adding to the Profits of the Tire Dealer, Without Undue Expense.

How the Electric System Works



Article XI

By A. H. PACKER
Instructor, Ambu Engineering Institute



An Explanation of the Principle of Magnetos

A Short Series of Articles Wherein Is Given the Fundamentals Underlying the Operation of the Modern Electric System as Applied to Automotive Apparatus

THE roads had been good, the engine ran like butter on a hot day and it looked as if I would make Westville in time for supper, for in that small burg if you are not on time for meals, they take the cold meat and lock it up, and only a strong pull with the cook has any chance at all. My desire to be in town on time can therefore be easily appreciated, also my dismay, when as I came around the bent to the cross roads, I saw that the road was blocked.

A detour sign indicated in the direction of the next town down the river, so I turned that way and soon came to a narrow wagon road that I figured would let me get back to the main road more quickly than by the official detour. So down the narrow trail I turned only to find when I came to the Westville bridge, that the bridge was torn up, which explained the reason for the sign that had first stopped me.

That was the only bridge at Westville so there was nothing to do but to take the regular detour to the next town and cross the river there, and by the time I got back to Westville it was nine o'clock and everyone but the hotel clerk was in bed for the night.

The next morning when I went to Bill Fixit's Garage, Bill gave me the laugh for taking a detour of my own that led to the same obstruction that had tied up the main road, but he didn't kid me very long for the Red Head was in trouble on a magneto equipped car and Bill wanted me to lend a hand and see if I could find the trouble.

"This is a funny one," said the Red Head, as I reached the back of the shop. "Well, they are all that way when you don't know what's wrong," I replied, "How does it act?" "That's just the trouble, it refuses to act, went dead on the magneto and when I turned it to to battery it wouldn't fire a shot either—that's what gets me—'cause I thought if it didn't work one way it sure would the other."

"That's a good one," I replied, "you and Bill had the laugh on me a while ago for taking a detour that led to the same obstruction and on this car you fellows have done the same thing. That old boiler has a low tension magneto on it, and practically anything that goes wrong with it, kills the action on both the battery and magneto side."

Bill and the Red Head sat and stared at me, then grinned at each other, and finally Bill said, "Well, I guess you're right, there are so few of these around now, I had plum forgot they use the same coil no matter which way you run 'em, and the trouble is most likely there." "If you got time you better show the kid here all about 'em, and I'll take a look too if you don't mind, and brush up a little myself." So digging up some paper and making a few sketches, we began an explanation of magnetos.

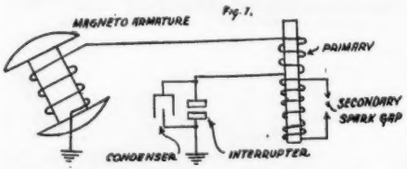


Fig. 1—Low tension magneto diagram (series connection). This circuit is similar to the battery ignition circuit of Fig. 2. The battery being replaced by the magneto, the armature of which generates the current for the coil

The way we will first think of a low tension magneto is as a substitute for the battery, and as in the battery ignition system we put a coil and interrupter in series with the battery, so in the magneto system we will put the coil and interrupter in series with the magneto.

Fig. 1 shows this method of connecting the magneto armature in which the voltage is generated, so that it is able to send current to the primary of the induction coil, then through the interrupter to ground and back to the magneto armature. Fig. 2 shows a similar ignition circuit except that the battery is the source of voltage, and from the sketches the similarity should be obvious.

GENERATING ACTION

Before further considering the action of the magneto as used for ignition we will study the action as shown in Fig. 5 and Fig. 6. Here the armature is shown in two positions, one where the lines of force from the permanent magnets, in going from North to South pass through the broad end pieces of the armature, and the other where the same lines of force are passing through the main part of the armature, these being the natural paths travelled because the magnetism always goes through iron whenever it has a chance.

It will be noticed that there is but one winding on the armature and that one end of it is grounded while the other is connected to an insulated terminal. The exact method of connecting to this terminal would be by means of a brush and slip ring, or similar method but at present we are interested in the generating action only.

As the armature rotates it takes the positions shown in these two figures and, of course, all intermediate positions, so that in changing from one position to the other, the lines of force in the winding are constantly dying out or building up so that we have a continually changing condition of magnetism in the primary.

This effect of changing magnetism is nothing new to us for we know that it always produces a voltage and as the magnetism is rising and falling as far as the coil is concerned, it must produce a voltage first one way and then the other way, so that the effect is an alternating one, and the current produced by such a voltage is called an alternating current, or briefly, A. C.

Referring now to Fig. 1 again we see

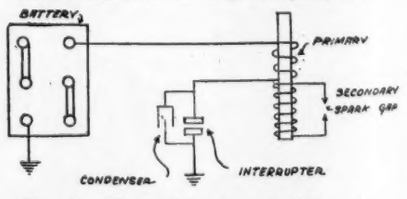


Fig. 2—Typical battery ignition circuit. Coil, battery and interrupter being in series

that the armature will send a rush of current through the coil, magnetising the core one way, then the current will stop reverse and rush the other way, magnetising the core in the reverse way. To get the secondary spark we know from

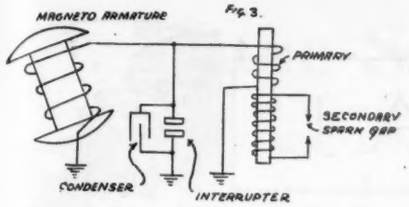


Fig. 3—Low tension magneto diagram (parallel connection). When interrupter points close A heavy crurent builds up in armature, and when points open, this current flows suddenly in primary, giving secondary spark

our study of battery ignition that it is necessary to interrupt the current through the primary when it is flowing, and that the heavier the flow the greater the voltage will be.

It is therefore apparent that the interrupter points of the magneto should open when the current is a maximum, and not when it has stopped and is just ready to reverse. This condition of maximum current is obtained when the armature is in the position shown in Fig. 5, just as the armature is leaving the tip of the pole piece and this may at first seem strange as there is apparently no magnetism going through the winding.

When we recall that it is not just magnetism, however, but change in magnetism that really generates the pressure, we can readily see the action, for the lines of force which have been going in one end of the armature suddenly find it easier to go in the other end, and it is in the position shown in Fig. 5 that the greatest change takes place.

For this reason the interrupter shown in Fig. 1 would actually be mounted on the end of the armature shaft, and so designed as to open at the proper armature position, and the condenser shown connected across the points would be located either in the magneto or in the coil box, but its connection would be the same regardless of its physical location.

PARALLEL CONNECTION

While the connection of the magneto in series with the coil and interrupter explains the use as a substitute for the battery, it is more commonly used in parallel with the coil and interrupter, in which way it is NOT similar to the battery system and for this reason Fig. 3 shows how the magneto CAN be used and Fig. 4 shows similar connections for a battery system but this is a method that CAN NOT BE USED, FOR THE CLOSING OF THE POINT SHORTS THE BATTERY.

PARALLEL OPERATION

It is therefore apparent that if an magneto that is parallel connected to its coil and interrupter also has a battery connection on the switch, that the switch must be designed to throw the battery in SERIES with the coil and interrupter, even if the magneto is in PARALLEL with them.

Considering the action of the magneto in Fig. 3 we find that as the armature rotates and the points open and close that the closing of the points shorts out the coil so that any current generated in the armature flows around through the points to ground and back to the armature, this being a heavy flow of current, but not a destructive one as would be the case with the battery circuit, because of the protecting action of the armature resistance.

As this current flows around in the armature turns it maintains a strong magnetic condition in the armature so that when the interrupter points open, the self induction of the winding or flywheel action that tries to maintain the current, will force current to flow suddenly in the primary of the induction coil, and this sudden current will magnetize the iron core and give a voltage in the secondary.

With the parallel method of connecting, the secondary spark occurs due to the building up of the lines of force in the core instead of the breaking down of the magnetic field, but the result is just as good if the magnetic change is as fast in one case as in the other.

It will still be observed however that it is the opening of the interrupter that produces the spark and this is true of all ignition systems that use a primary and secondary coil, that the closing of the points merely loads up the circuit, but the opening of the points produces the high voltage action that fires the gas.

ROTATION CHECKING

The magneto will generate alternating current if driven in either direction, but when operating in connection with a coil and interrupter, it is usually O. K. for but one direction because the interrupter is made to open when the armature is just leaving the tip of the pole.

We find that if properly constructed for right hand rotation that when turned left hand, the interrupter points will open when the armature is approximately horizontal or across the poles, and we know that in this position, while the magnetism is the greatest, that the change in magnetism and therefore the voltage is practically zero, so that no spark would be obtained from the magneto if run in the wrong direction.

We must also consider the effect of

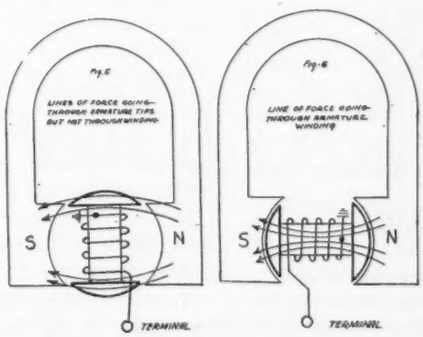


Fig. 5 (Left)—Low tension magneto generating peak of A. C. voltage

Fig. 6 (Right)—Low tension magneto armature position as A. C. voltage passes through zero point

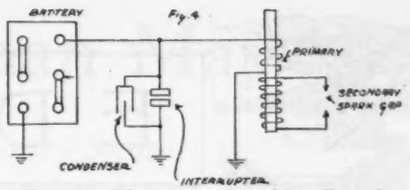


Fig. 4—This sketch is like Fig. 2 except battery takes the place of the magneto armature. This will not work because closing of interrupter points shorts the battery

spark advance which is usually accomplished by shifting the interrupter housing so that the shaft turns farther before the points open in the retard position than in advance. If we want the armature to be in the position of the highest voltage we can have it so, but for one setting of the interrupter housing only, so that if the magneto were designed to give its strongest spark on retard, the advance spark would be weak, and if the advance spark were made strongest, then the retard would be weak.

This last alternative is the most commonly chosen, for it is important to have a good spark for the running condition, and while the spark is weak for starting it does not make so much difference for the start is usually made on battery.

In checking for correct rotation, we should therefore set the interrupter in the advance position for the rotation we are assuming, this always being against rotation.

GROUNDING BRUSH

In Fig. 7 is shown a sketch of an armature with bearings, the magneto being the type used with make and break ignition where the make and break points are inside the cylinder of the engine, and the flash at the points as they open is used to fire the gas. The winding is grounded at one end while the other end connects to a slip ring from which the current is collected and goes to the coil then to the points and to ground, or frame of the engine.

Now we know that every circuit must be complete for the electricity to be able to flow, so that we must be able to trace the current back to the winding. To do this the current would aparently have to go through the bearings, except for a connection made by the ground brush.

Current through the bearings would have two bad effects, one being that the oil and grease of the bearings being of an insulating character would make it hard for the current to flow, so that the ignition would be poor, and in the second place, the current flowing through the grease would arc and cause a burning action that would soon roughen the bearings and eventually ruin them. For this reason the ground brush is always used on any magneto where the winding rotates.

DISTRIBUTER SETTING

A wrong idea as to the action of the distributer is held by many mechanics who work on motor cars, for the impression prevails that the spark occurs

(Concluded on page 30)

EDITORIAL

Sticking By the Stand-by

THE ups and downs of the automotive business during the recent months have demonstrated at least one thing, which is that, regardless of the rise and fall of vehicle sales, the business in equipment, accessories and supplies is fairly stable. It does not by any means follow the curve of sales of complete vehicles.

The extent to which this equipment business, and particularly a dozen or so of products, can carry the burden of a business in off times serves to emphasize the need for taking care of this hard-times friend when times are not so hard. If the equipment business can help hold things up when business is not good, how much more necessary is it in good times that this phase of the business he fostered and increased.

In the jobbing business there would have been rather uncomfortable figures if certain lines of goods, which are useful and necessary in the upkeep of vehicles, had not continued to move in fair volume when the less essential lines decreased.

And does it not indicate to the dealer, shop man and garageman the wisdom of fathering this department of the business in prosperous times, for each added dollar of revenue is—an added dollar of revenue. A sufficient number of these added dollars can double the profits of a business.

To establish and maintain an accessory and equipment department is not difficult or costly. A stock, adequate for most needs during the period when business is being developed, does not run into a large amount of money, and the smaller the investment is kept, within reason, and the more frequently it is turned over, the greater is the profit. It is one of the inspirations in the great game of business to see how much a single dollar of investment can be made to earn in a year—and this depends on frequency of profitable turnover.

The principal necessity in establishing an accessory department is a proper place to carry the goods. They should be located near the front of the establishment where they will continually be seen by the public. If there is a show window it should be utilized—and the display cleaned up and changed at least once a week. A show case or runway cabinet is also useful in most buildings.

Then comes the second essential, and the one which determines the growth of the business. Somebody should take an interest in it and make an effort to sell the goods, and the more people who take an interest in this work the greater will be the business.

Dealers who need information on how to start a business of this kind can—or should be able to—find an ally and source of information in the jobbing salesmen who call on the dealers. These men should be able to list a minimum stock for beginners and help with suggestions as to how to keep it moving. There is one man in the middle west whose accessory department, started some years ago, is earning him about $1000 a month today, all through the days when car sales have been slow. During his days of prosperity he developed this department, and it is now a greater stand-by in the present period.

MOTOR AGE is always pleased to assist when it can in supplying information on this subject and will be glad to aid to the best of its ability any of its readers who desire to develop this phase of their business.

The Fixed Price System

PRACTICALLY all of those service institutions which have been using for some time the fixed priced or flat-rate system of selling service are of the opinion that the entire automotive industry will be operating on that basis in the next few years.

Whether or not this becomes a reality it is certain that those who have tried the fixed price system are thoroughly in favor of it. Many more would, no doubt, be willing to give it a try but are at a loss as to where to begin.

The fixed price system in order to function properly must be worked for each institution, because labor conditions, the number of cars in the field, equipment, etc., are all factors that determine the costs of the various repair or service operations.

Let those who wish to try the fixed price system begin by accurately timing a good mechanic on the various operations, such as valve grinding, etc. The process of timing must begin from the moment the man touches the car and stopped when he puts the hood on the car again. After several men have been timed in this way an average can be struck for the job and a price fixed accordingly.

This then will be the cost for that job, but it must be checked. The price may be found too low or too high and naturally the oftener the job is done and checked, the more figures will be available for checking, so that ultimately a figure will result which comes pretty close to being the time and cost for any particular job and which will insure a profit to the service station and at the same time be fair to the customer.

In determining the time factor for any given service operation in the fixed price system the work of the best mechanic should not be taken, as he may be an exceptionally good man and capable or doing any job quicker than another man. The time factors should be determined from the work of an average good mechanic.

June Sales Better Than May

Price Reductions Throughout the Country Show Marked Increase in New Car Business

CHICAGO, June 20—The experience of dealers here since price reductions began to have an effect in car sales is varied and ranges from "fair" to "nothing ever like it before." Every line that has offered reductions has felt a boost in sales. Dealers generally report an increase over the corresponding period last year and their opinion on the subject of future sales, that is, for the remainder of the year, shows an optimistic trend.

No one believes that June sales will be held at anything like their high level for any great length of time. Each announcement of reduced prices has brought a rush of orders. In some cases business has settled down to below normal after two weeks following the reductions.

NEW YORK REPORTS BRIGHT

New York, June 18—Spurred by price reductions which seem to have convinced at least part of the public that automobile prices have at last been stabilized, and by ideal June weather, passenger car sales in the metropolitan territory since June 1 have run far ahead of May business, which in turn was 727 cars ahead of April.

Actual figures on June sales will not be available until the end of the month, owing to lack of daily compilation of figures in the Motor Vehicle Department, but reports from Albany show that there has been a veritable avalanche of registrations.

May registrations just compiled for 10 counties in and around New York show a gain of 727 over April. This in itself is an illuminating commentary on the effect of substantial reductions. April had been a big month, sales having been stimulated by the early spring buying. May started off poorly and indications at the end of two weeks were that the April total would not be reached. However, following the lead of Marmon and Jordan, price reductions followed each other rapidly throughout the month and by the fifteenth sales were running far ahead of the daily record of April and the final report showed that the last half of May had splendidly offset the slump of the first two weeks.

PORTLAND SLOW TO RESPOND

Portland, Ore., June 18—Sales of new automobiles in Portland during May totaled approximately one and one-half times as many as during April, according to the record of new licenses secured during the two months. Whether June will show further increase or will run behind May in volume is a matter for speculation. The record of new licenses forms an excellent basis of comparison. According to the record, April sales of new cars totaled 444, while May sales totaled 681. In each case slightly over half of the new cars were Fords.

Recent price reductions have increased activity in some lines, particularly Dodge, but daily license reports indicate that so far, all makes concerned, reductions have had no marked effect yet.

INDIANAPOLIS SALES INCREASE

Indianapolis, Ind., June 17—Retail sales here show a slight improvement thus far in June over April and May of this year. The average increase is about 10 per cent. The increase is more marked on those cars in which price reductions were made. Dealers handling cars on which price reductions have been made say that for a month or six weeks following reductions a decided increase in sales can be seen but the rate soon decreases. Larger increases are shown by the medium and low priced cars. Dealers in high priced cars report only a slight increase over the two preceeding months and in some cases no increase at all.

MINNEAPOLIS SALES UP 30 PER CENT

Minneapolis, June 17—No doubt exists that the automobile business has improved the first half of June over the two preceding months. A difference of opinion exists as to the percentage of gain. One of the biggest distributors of moderate priced cars places the gain at 30 per cent. At the branches and agencies where prices have been reduced and where some models have been out of alignment, especially in the smaller popular sizes, the new prices have stimulated buying. Business still is better in the larger towns than in the country districts, for the money situation has not loosened up enough yet to make large buying possible to small dealers. In some districts the money situation is improved and in others it is worse.

LOS ANGELES DROPS BACK

Los Angeles, June 17—Stimulated by price reductions, retail automobile sales now are more numerous than in the corresponding period of May or April, but indications are that this condition will not continue long. Immediately following price changes, salesmen bore down on every prospect who could be swayed and obtained signed orders. This number now is about exhausted and already a slackening is evident. Business right now is very good and June will be an excellent sales month, but southern California has led the entire United States throughout the year and the present cannot be taken as a criterion for the future when the existing impetus will have passed.

DES MOINES SALES BRISK

Des Moines, June 17—June retail sales show material improvement over April and May. Conservative dealers attribute this to stimulation of business by price reductions. Those cars which made reductions during the past 30 days have had a brisk business. Dealers are perplexed as to whether or not stimulation is permanent or temporary but are inclined to believe that the next 30 days will see more or less activity followed by a letting down, although the stagnation of spring is not expected. Two distributors whose companies made material reductions report their stocks completely cleaned out.

BOSTON BUSINESS IMPROVES

Boston, Mass., June 17—Retail automobile sales during the past few weeks show an improvement over April and May sales. The dealers whose makers had reduced prices found that people who had been holding off came in and closed up orders. There was a number of new orders booked from others who were not on the list of prospects. All dealers have not been selling as largely as a year ago, of course, but when an average is made of the entire motor district, balancing up the sales of high and low priced cars, and those which have cut with those which have not, the conditions in the trade are much better than a month ago when there was a lull after the show orders and prospects had been cleaned up.

A Condensed Business Report

MANY Chicago dealers believe that increased sales have come to stay.

New York sales for June have run far ahead of May.

Portland takes one and one-half times as many cars in May as were placed in April.

Indianapolis sales improve slightly in June.

Minneapolis claims 30 per cent increase, while Los Angeles, after spurt, drops back. Des Moines and Indianapolis both have bright side.

Intelligent Optimism Is Panacea for Tire Dealers

Situation Holds Nothing That Should Add Gloom to Present and Future Marketing

AKRON, O., June 20—Although automobile manufacturers' original equipment tire specifications have been materially reduced since the first of May, owing to the unexpected slump in buying of automobiles, dealers' tire sales are holding up encouragingly according to Akron tire manufacturers. Few more men will be laid off in Akron tire factories, it is stated, and production is expected to continue as at present until automobile sales are stimulated, when an increase in manufacturers' business is anticipated.

In a statement issued by L. C. Rockhill, general sales manager of the Goodyear Tire & Rubber Co., gasoline consumption, which is regarded as a good indication of how much automobiles are being used, was 17 per cent greater in January, February and March of this year than for the corresponding months of last year. February gasoline consumption was 9 per cent lower than in February last year, but March consumption was 35 per cent higher than in March last year, indicating an increasing use of automobiles which will cause consumer tire sales to hold up steadily.

Sale of Tires Increases

The Goodyear company reports that more automobile tires were sold to dealers last week than during the corresponding week of last year, and also that the week's business to dealers was larger than during any one week since last September. This reflects an increased consumer demand and is probably the result of the fact that there has been no appreciable curtailment in the use of passenger automobiles.

A mistaken impression exists regarding the stocks of automobile tires in the hands of manufacturers. Regarding dealers' stocks it must be borne in mind that dealers have been reducing these stocks since over a year ago and have bought only their current requirements, so that these stocks are probably low at the present time. Regarding stocks of tires in manufacturers' hands, it is interesting to know that reliable statistics covering the bulk of tire manufacturers show that while there was a seven months' supply of tires on hand at the end of November, 1920, this was reduced to a two and one-half months' supply at the end of April. This is figured on the basis of the number of tires on hand at the end of the month compared with the sale of tires during the same month.

Some dealers have been reluctant to buy for the past several months because they expected price reductions, and stocks were adequate to supply their needs promptly. Prices have now been reduced and stabilized and manufacturers' stocks are now low. Business may not boom, but it is going to be good. Although general business has not yet returned to normal, there has been a very perceptible improvement in some phases of the tire business. Automobile manufacturers' requirements for tires have been reduced lately, but it is gratifying to know that the automobile tire business has shown a remarkable improvement during the past three weeks.

There is no occasion for pessimism in the tire industry, but rather the present calls for intelligent optimism and a lot of aggressiveness.

Most Akron companies report that dealers' sales are holding up substantially. Firestone continues on a production basis of about 17,000 tires a day and anticipates no further retrenchment, officials say. Goodrich, although making office personnel reductions, salary cuts, and reducing vacations to a one-week limit, is producing 15,000 tires daily and not contemplating any further production reduction.

Dealers Aim to Stop Used Car Sales on Detroit's Vacant Lots

Detroit, June 18—H. H. Shuart, manager of the Detroit Auto Dealers Association, on behalf of that organization has written a letter to John C. Lodge, president of the City Council, announcing willingness of the association to co-operate heartily in the city's effort to clean up Woodward Avenue, particularly as regards the removal of used car stands on vacant lots. Members of the organization now using lots, Mr. Shuart said, are willing to conduct their business elsewhere, and are very anxious to lend their efforts in forcing others from lots on the leading thoroughfares.

In the majority of instances the used car stations are maintained by persons who are in no way connected with the dealers association and in only a few cases are members of the association occupying open space. In his letter to Mr. Lodge, Mr. Shuart says, "Detroit is the laughing stock of the country on account of the promiscuous display of broken down automobiles on vacant lots all over the city and, as the home of the automotive industry, we should have enough pride in our city to see that used car dealers conduct their business along the same lines as other merchants."

PHILADELPHIA SALES GOOD

Philadelphia, June 18—Carloads of passenger cars are being shipped by factory and are coming by driveway to Philadelphia in large numbers, which promises well for the industry in this locality. For instance, the Overland-Harper Co., of this city, according to H. B. Harper, president, is enjoying an increase of more than 40 per cent over the business done for this period in 1920 and a 70 per cent increase over that done in the corresponding period of 1919. Since the recent price reduction, Mr. Harper says, orders are coming in so fast that they cannot be filled.

West Coast Sales Recall Halycon Days of Wartime

Reviving Confidence Is Bringing Splendid Business to Dealers. Used Car Business Bad

SACRAMENTO, CALIF., June 18—The halycon days of wartime automobile trade showed little more activity in the motor car market than has been exhibited in this district in the last two or three weeks. The rapidly dropping price conditions have been the principal cause of the renewed buying, of course, and they have served to relieve dealers of automobiles almost as soon as they reached the sales floor, often before.

One result of the increased activity is noticed in the gradual return to former hours and days of business. Following the heavy demand of wartimes, when dealers agreed to close Sundays and evenings, came the period of depression and many of the sales rooms were kept open almost at all times in order to catch every possible prospect. The revival of buying has obviated this necessity, however, and it is entirely probable the end of summer will find automobile row closed from Saturday noon to Monday morning.

The decrease in the price of new cars has brought a stagnate condition in the used car market. Vacant lots about the city are filled with dealers' offerings of second hand automobiles, which are moving only at bargain prices. Trade-ins are not sought as a few weeks ago, and one or two dealers are considering a plan of outright sales, the owner of a used car to solve the problem of disposing of it in case he wants a new one. This plan is not likely to be put in general operation, but the loosening of the offers for old cars will have practically the same effect. Many used car owners now, in fact, are selling their own cars in the belief they can do better.

35 CARS IN BEE TROPHY RUN

Sacramento, Calif., June 18—The annual Economy Run of the Sacramento Motor Car Dealers' Assn., to Lake Tahoe and return, will be held June 27 and 28. The run is about 250 miles and includes all kinds of road conditions, from paved highways to steep and tortuous mountain grades. The run, which is for The Sacramento Bee trophy, was won last year by the W. J. Bonsen Co., with the Stephens Salient Six. Twenty cars already have been entered, and it is predicted that there will be 35 automobiles at the starting line on June 27.

REDUCE COLUMBIA BATTERIES

Cleveland, June 18—The National Carbon Co. has put into effect a reduction of approximately 20 per cent on Columbia dry batteries. The price reductions vary somewhat in different sections of the country because of freight differentials, but 20 per cent represents a fair average of the reduction.

Europe's Hardest Race Goes to Fiat; Mercedes Is Second

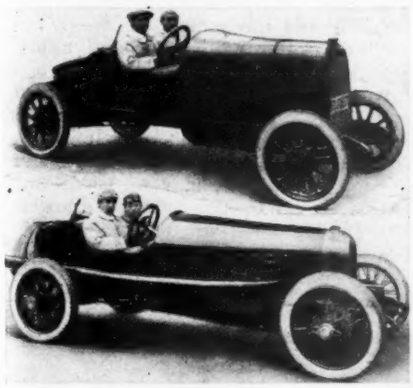
Mountain Course of Targa Florio Is Supreme Test for Cars and Drivers

By W. F. BRADLEY

European Correspondent of MOTOR AGE.

PALERMO, SICILY, May 31—Fiat defeated Mercedes in the first European automobile race open to late enemy countries. The occasion was the twelfth annual Targa Florio 268-mile race around a mountainous course on the Island of Sicily. Count Masetti, an amateur, covered his distance on a 300-cu. in. racing Fiat in 7 hrs. 21 min. 5 sec., or at an average of 36½ miles, thus winning first prize and breaking all previous records.

A week before the closing of entries the German Mercedes Company announced that it would take advantage of the open rules to enter this race, and a team was sent comprising three 6-cylinder cars of 105 by 140 mm. bore and stroke, to be driven by Lautenschlager, twice winner of the French Grand Prix; Seiler, and Gros. No expense was spared to secure success in the race, and in view of the high quality of the cars and the reputation of the drivers, it appeared doubtful if the Italians, who were about thirty strong, could win the trophy. The Bosch Magneto Co. also make an important effort by offering big money prizes and undertaking to fit magnetos free to all Italian cars.



Above—Bergese on the 10-15 hp. Fiat, first in the 120 cu. in. class, at 33 miles an hour, in the Targa Florio race

Below—Minoia on the 1920 type 183 cu. in. Fiat in the Targa Florio race

This race resolved itself into a duel between Seiler, the German driver of the Mercedes, and Masetti on the Indianapolis Fiat. On the first of the four laps the German led by 19 sec. At half distance Masetti had worked his Fiat into the leading position with a margin of 2 min. 29 sec. On the third lap the German closed up until the Italian had a lead of less than one minute, but the Mercedes weakened toward the ends and the Fiat finished with an advance of 6 min. 11 sec. Compared with track performance the average looks low, but the race was one of the hardest ever run in Europe, for more than 6,000 sharp turns had to be negotiated in the 268 miles, and the only level portion of the course was very rough.

Driver	Car	Displacement Cu. In.	Time
Masetti	Fiat	300	7.21.05
Seiler	Mercedes	460	7.27.16
Sivocci	Alfa-Romeo	274	7.31.43
Ferraii	Alfa-Romeo	274	7.73.45
Foresti	Itala	183	7.34.37
Moriandi	Itala	183	7.39.34
Minoia	Fiat	183	7.47.46
Ceirano	Ceirano	183	7.59.12
Bergese	Fiat	120	8.06.34
Arnone	Ceirano	183	8.11.11
Febo	Fiat	120	8.36.59

1212 Fords Represent Pulse Beat In Oregon Car Sales

Portland, Ore., June 18—Nearly 50 per cent more new Ford cars were sold in the city of Portland during the period from January 1 to May 20 this year than during the same period of last year, according to a summary of Ford business given by S. A. Stellwagen, manager of the Ford factory branch in Portland, which has charge of distribution of the cars throughout the state of Oregon.

From January 1 to May 20 a total of 1212 new Fords were delivered by the Ford factory branch to the six authorized retail Ford dealers of this city, accordto Mr. Stellwagen's report. That all of these cars been sold by the retail dealers to the public, or have been spoken for, is indicated by the statement that at the present time, in spite of the heavy deliveries, the Ford branch is 335 cars behind the needs of the retail dealers.

Last year, for the similar spring period, 851 Ford cars were delivered, according to Mr. Stellwagen's report, this spring's business showing an increase over last of 361 cars, or an increase of about 40 per cent. Sales throughout the entire state of Oregon show a distinct increase for the Ford this year, corresponding to the increase in Portland, Mr. Stellwagen said. Taking the state as a whole each month from January to June has shown an increase, he said, over the corresponding month of the spring of 1920 of from 40 to 62 per cent on deliveries.

FORT WAYNE BUSINESS BOOMS

Fort Wayne, Ind., June 16—The recent price reductions in some of the leading makes of cars brought a veritable rush of orders to the local dealers. The Shyrock Automobile Co. sold nine Buicks on the first day after the price reduction went into effect to purchasers who came to the company's salesrooms without any solicitation. The Hayner company, dealers in Fords, reports that the Ford reduction quickened business immensely. It is expected that the present boom in the selling of cars in this city will continue for some weeks at least. Dealers believe that a great many local people who have really been wanting cars have held off buying on the hunch that the price reductions were sure to come.

Texas Sales Promise Record Breaking Volume This Year

Dealers Claim Conditions Are Just Right for Best Season in Industry's History

DALLAS, TEX., June 18—The automobile business — including automobiles, trucks, tractors, tires, accessories and related lines in Dallas this year should amount to $250,000,000, wholesalers and retailers believe. The business last year was around $200,000,000, and this year it is expected to be better. The first five months of the year have showed a decided increase over the same period of last year and the dealers of the city declare business is picking up rather than falling off. They expect the increased business to continue right along until late in the fall, and even then they do not see any reason for a sensational slackening in this district.

Most Productive Territory

Dallas automobile men assert that the territory covered by the dealers here is the most productive of business in the United States right now. This territory includes all of north Texas, the banner grain and cotton country of the South, all northwest and west Texas, the greatest oil and cattle sections of the country, all New Mexico, another cattle country, and parts of Oklahoma and Louisiana, rich farming and oil sections. These territories are just waking up to the necessity of automobiles, trucks and tractors, and the Dallas dealers and distributors are supplying them. The dealers believe the business will continue to increase for several years and are preparing to care for it.

Enormous Business is Expected

During the present year dealers and distributors figure on selling 35,000 automobiles at an average of $1,500 each. It is expected 10,000 trucks at an average of $3,000 each will be sold. The tire men declare it will be easy to dispose of 500,000 tires and the accessory men believe their business will amount to $100,000,000. The trailer and tractor business of the Dallas retailers and distributors will probably amount to $50,000,000 and the repair business to more than $50,000,000.

Including the factories and other forces in distribution of cars or handling the repair work, tires and accessories, between 10,000 and 15,000 persons are employed in Dallas. The annual pay roll is slightly more than $2,500,000 and the industry right now is spending some $5,000,000 for improvements and additions which are necessary to care for the increased business. Already more than 4,000,000 square feet of space is devoted to the automobile business in this city and there is never a week passing without additions to that amount.

Ford Denies He Asks Credit; Parts Makers Apprehensive

Ten-Day Extension of Payment Date Gives Big Manufacturer Substantial Monthly Sum

DETROIT, June 18—Reports become public to the effect that the Ford Motor Co. is demanding an extension of 10 days in the discount period and 60 days net credit with the idea of gaining a financial advantage, brought vigorous denial today from Fred H. Diehl, purchasing agent. As a matter of fact, he said, Ford is now paying cash for materials. He declared the printed circular sent out simply fixes a definite payment period on all invoices.

This circular has caused considerable apprehension among the parts makers with whom Ford deals heavily. There is no complaint regarding conditions as they exist at present but these manufacturers assert that without refinancing their business, which would be extremely difficult, if not impossible under present conditions, they could not carry the financial burden which would be involved if they were called upon to grant Ford 60 day credit. They take the position that they already have borne more than their share of the burdens of the industry in the past year and that no more can be expected of them.

There also is considerable complaint because of Ford's arbitrary extension of the payment date to the 20th prox. Some parts manufacturers regard this as more serious that the 60-day clause for the reason that they probably will have to submit to the one, while they would not consent to the extension of the credit period. It is contened that this action on the part of Ford will give him a substantial sum in interest each month which rightfully should belong to the companies which supply him with material.

FILE DATA FOR DEALERS

Louisville, June 18—Among the reference files that will be accessible to members of the Louisville Automobile Dealers' Assn., is a credit rating system which is designed to furnish accurate and up-to-date information that will be of value to dealers in their relations with new patrons.

A card index file also is being prepared which contains the names of all dealers in the state. This file, revised every few months, will list names and addresses, the name of the car or cars handled, names of officers or heads of firms, data showing whether trucks are handled in addition to passenger cars, whether a service station is maintained, and similar facts. This list will be useful to members of the local association when sending out invitations to the annual automobile show, as well as for general reference purposes.

The file will be more comprehensive, as far as the automobile business in Louisville is concerned. It will include additional information on automobile dealers and will also include the names of dealers in trucks, accessories, sundries, oil and gas, and other lines related to the automobile business.

Northway Motors Launches New Merchandising Policy

Boston, June 18—Coincident with the placing of fifty new Northway salesmen in the field this month, the Northway Motors Sales Co. will begin an active truck merchandising campaign in the territory covered by its thirteen factory branches in the east. For the carrying out of this new sales policy, President James F. Cavanagh has gathered around him a staff of men of long experience in the sales, service and advertising phases of the motor truck industry. These men include Joseph Husson, general sales and advertising manager; W. E. Downs, assistant general sales manager; H. F. Flugge, general service manager; F. L. Ortla, assistant service manager; C. P. Williams, in charge of certain service work; Albert Rice, delivery department; J. H. Reilly, body department; R. B. Sill, branch sales manager; H. W. Pierce, manager of dealer sales; Richard A. Magee, direct charge of advertising.

England Makes Ready for Two Big Races During 1922

Names Dates and Regulations to Govern "Tourist" Trophy and "Fifteen-hundred" Contests

LONDON, June 13—(By Mail)—The regulations for the International Tourist Trophy Car Race and for the International "Fifteen-hundred" Trophy Car Race, to be organized by the R. A. C. next year, have now been issued, probable dates of the races being Tuesday and Thursday, June 20 and 22. Owing to the war, and the conditions of the motor industry after the war, no race has been organized by the club since 1914.

The races are open to car manufacturers in countries represented in the International Association of Recognized Automobile Clubs.

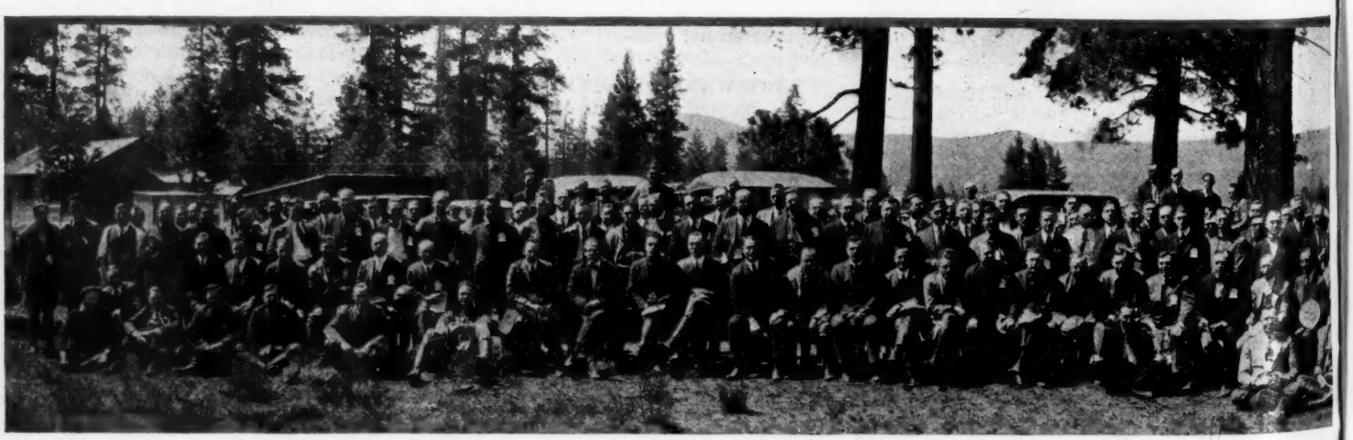
The distance of the Tourist trophy will be about 300 miles and of the "Fifteen-hundred" race about 250 miles. In the Tourist trophy race, the engine must not have less than four working cylinders and shall not be less than 2500 c.c. nor more than 3000 c.c. The minimum weight is 1600 pounds, this weight including everything except driver and mechanic.

Regulations Applying to Races

In the "Fifteen-hundred" race the engine must have not less than four working cylinders and shall not exceed 1500 c.c. The minimum weight is 1000 pounds, including everything except driver and mechanic.

The following regulations apply to both races: the cars must have four wheels. The body is not restricted as to shape. A fuel tank or tanks of any size may be carried, and only liquid fuel, which includes, (inter alia), gasoline and benzole, may be used; but no aids to combustion will be allowed.

The entry list will be open at the club on July 1. Not more than three cars of any one make will be allowed to compete.



Los Angeles, June 4—Over four hundred Los Angeles motor car dealers with their salesmen and guests from the allied trades held dino, across a ridge of mountains, over the Mojave desert on the Mormon trail, and up to the summit of the mountain, were laid new makes, participated. Thirteen of the old cars finished

Sales Throughout Ohio Take Spurt Under Low-Price Dope

Buckeye Dealers Coming Under the Wire Strong As Result of Price Concessions

COLUMBUS, Ohio, June 20—Under the stimulus of price reductions and better industrial conditions, business in passenger cars in Columbus and central Ohio territory has shown remarkable increases in the past few weeks. Practically all dealers are sharing in the better business, although those representing the cheaper and medium priced lines are reporting the biggest increase.

The public apparently had been waiting for the reductions and immediately stepped into the market and purchased freely. Dealers report a larger number of prospects, many of which are considered high class and likly to be new owners.

In the rural sections there is still some slowness although an increase in sales is reported from the dealers in the larger towns. Farmers are now busy with their crops and have little time to look around. With their crops in, it is believed there will be better business in the rural sections. Farmers are now getting over their pessimism to a certain extent and are inclined to buy more freely of everything, including motor cars.

The truck business is still quiet and the public is apparently waiting for price reductions. Dealers are sitting tight, waiting to see what policy the manufacturers will follow after July 1 or thereabouts, which is the start of the contract year.

MASON SALES TREND UPWARD

Akron, O., June 18—Officials of the Mason Tire & Rubber Co., say that before July 1 the company will have exhausted rubber, and will base all future production upon purchases of crude rubber at an average cost of 16 cents a pound.

Mason production now is running at 1,500 tires a day and plans are being made to increase to 2,000 tires daily before the first of next month. About 90 per cent of the entire Mason production is cord tires, as the company discontinued the manufacture of fabric tires larger than 30 by 3½ some time ago.

Officials report May sales were in excess of sales for the corresponding month of last year and state that present business indicates that June sales will show an increase of nearly 100 per cent over June of last year.

Quaker City's New Garages Number 566 Since January

Philadelphia, June 18—This city is making a record in garage building for both public and private purposes. Garage permits lately have been issued at the rate of 18 a day. There is a notable demand, too, for the "community" type of garage, which has been a general favorite in Philadelphia for the last two years. The usual plan is to form a sort of motor center about them, with a headquarters for tires, accessories and repairs, sometimes the owner of the garage being proprietor of the retail and repair shops clustered there. It is not uncommon to see batches of these garages comprised of forty and fifty in a place.

Motor car dealers here point to the increase in garages as a most favorable sign that the "saturation point" in cars is a myth. Since January 1, there have been 566 garages receiving permits, as a cost of approximately $1,000,000.

OSHKOSH TO GET LA CROSSE

Oshkosh, Wis., June 13—As the preliminary step toward the transfer of the works and offices of the La Crosse Tractor Co., manufacturing the Happy Farmer tractor, from La Crosse, Wis., to Oshkosh, Wis., a new corporation styled the Oshkosh Tractor Co. has been incorporated under the laws of Wisconsin. The capital stock consists of $1,500,000 preferred stock and 15,000 shares of common stock without par value.

Mack Truck Sales' Gain Promised Through 1921

President of Corporation Tells Stockholders That Year's Business Is 85% of 1920

NEW YORK, June 18—President A. J. Brosseau of the International Motor Truck Corp. has informed the directors "that only an utter collapse in the general business in the second half of 1921 will be likely to change the apparent gradual gain in the volume of sales, production and profits to which the company may look forward." Current business is running at a rate equal to 85 per cent of the 1920 figures when gross sales amounted to $34,000,000.

Reduction of Inventories

Highly gratifying progress has been made in reducing inventories, and in the first four months of 1921 there was an actual reduction of $2,000,000. By June 30 the net reduction will amount to more than $3,000,000. No commitments have been made for incoming raw materials beyond those sufficient to meet current manufacturing requirements.

It is expected that by July 1 the finished truck inventory will be down to a normal total based on the present volume of business. This means that manufacturing operations at the three plants will have to be increased soon after July 1 to a rate approximating sales. In order to bring down truck inventories, operations since January have been at a smaller rate than monthly deliveries of trucks.

International motor truck continues in the strongest financial condition. It has no bank loans whatever and its cash balance approximates $4,000,000. The company came through March without any loss in net profits and there was a slight margin above depreciation, taxes and all other charges. Business now is running at approximately double the 7 per cent dividend requirements on the two issues of preferred stock.

their annual three-day outing in Big Bear Valley, a mountain resort of California. A schedule and route through San Bernar- out for the cars to follow. A feature of the outing was a reliability motor car contest in which forty cars, representing old and with a perfect score against eleven of the new cars.

Ear-to-the-Ground Attitude Represents Makers' Pose

Manufacturers Not to be Led Astray By Rush Orders. Study Situation Carefully

DETROIT, June 18—Employment figures for the week ending June 11 show an increase of but 124 men over figures for the previous week in 79 industries in Detroit including practically all automobile plants. Twenty-seven factories are operating on reduced schedules and these factories are employing 20,312 men, an average of 31 hours each week.

The employment situation throughout the state as regards automotive plants is not as bad as in Detroit. Good business and splendid prospects are reported by the Michigan Brass & Iron Works at Lansing in a statement by T. E. Hackett, secretary-treasurer. The plant now is on a 55 per cent production basis and everything points to an increase shortly.

Hackett declared that, insofar as he could discern, the business slump was passing rapidly, if it had not already been obliterated. The company depends almost entirely on Lansing automobile plants and one or two engine companies in that city, in all of which, their orders indicate, business is on the upward grade.

The Lansing Foundry Co., at Lansing, has resumed production on a 40 per cent normal basis, following a long period of inactivity. Many orders and inquiries are being received from all parts of the country, new employees have been taken on, and plans are being made for a steady increase in production and employment during the summer and fall. The plant was closed from November 1 to May 1, and, since reopening, conditions have improved steadily until last week when it was decided to begin operation on the 40 per cent basis.

Olds Motor Works turned out 142 automobiles last Friday and daily shipments from that plant are averaging around 125, according to Sales Manager Peasley. A gathering of Olds distributors including Chas. H. Tucker, of Omaha, former sales manager, C. F. Batschelder, of Macon, Ga., R. V. Ramsey, of Kansas City, and H. C. Dunn, of Boston, was held at the factory last week and optimistic reports were received from all sections. The most gratify ing statements were made by Robert Newman, a southern distributor, who declared conditions in the south, where the effect of the slump seemed to be most acute, were improving, and while it would be a long time before things became normal, there was every indication of good business in the south in the not too remote future.

The Olds plant still has some orders ahead and will continue on the present schedule, between 125 and 150 cars a day, indefinitely according to officials.

The Buick and Chevrolet plants at Flint and the Oakland factory at Pontiac are specding production to meet a sharp increase in demand as the result, factory executives say, of the price reductions. Officials admit frankly the sudden spurt represents an accumulation of orders previously withheld owing to determination on the part of buyers to sit steady until the price reduction on the car of their choice had materialized, and believe it may be followed by another slump.

Some manufacturers, however, incline to the belief that rumors of price reductions, even before the first announcements, demoralized the market and stopped buying at a time when the normal spring business should have been at its height, and predict a steady demand throughout the summer.

Factory and sales executives are keeping their ears close to the ground, and representatives are touring the various sections of the country seeking to get a definite line on actual conditions that will permit of some definite manufacturing policy.

Caution is the watchword and none of the companies are going to be led astray by the present rush of orders reaching nearly all plants. It will be the policy to steer close to shore and confine production schedules to actual orders from dealers based on a careful analysis of their individual territories and their probable requirements from week to week.

Driveaways are becoming frequent, especially from the factories out in the state. G. E. Merkle, manager of the Chevrolet branch in Detroit, staged a driveway of 116 cars last week from Flint, representing a retail sales in Detroit territory for one week. The Studebaker plant is sending away many cars almost daily to various distributors in the middle states and eastwardly. Scores of Oldsmobiles, Oaklands and Buicks also are passing through Detroit daily, while scores of Hupps, Paiges, Maxwells and in fact all Detroit made cars are being driven to Indiana, Ohio, Illinois and Pennsylvania points.

LEXINGTON CHANGES PRICES

Connersville, Ind., June 17—Reductions ranging from $200 to $600, effective June 20, have been made by the Lexington Motor Co. The old and new prices follow:

	New	Old
"S" touring car	$1885	$2285
"S" thoroughbred	1985	2285
"S" Lex-sedan	2185	2785
"S" coupe	2750	3250
"S" sedan	3150	3350
"T" touring	2785	2985
"T" sedanette	3750	4150

STANLEY STEAMER REDUCES

Chicago, June 17—Reductions in the price of Stanley steam cars range from $1300 to $1850 on various models. Comparative prices are as follows:

	Old	New
5-passenger phaeton	$4200	$2900
7-passenger tour	4200	2900
4-passenger coupe	5950	4100
7-passenger sedan	6100	4250

New Prices Have Slowed Up Sales In Used Car Market

Cleveland Dealers Forced Into Bargain Day Scheme to Attract Backward Buyers

CLEVELAND, June 18—The demand for used cars has declined greatly in this city in the last month, and there has been a corresponding increase in sales of new cars.

Dealers visited today report that while early in the spring of the present year, the greater volume of business was in used cars, the situation is just the reverse today.

At the Chevrolet sales agency it was explained that the shortage of new cars a year ago brought a tremendous demand for used cars. Prices went up and the used car was a big asset to the average man in business. Late in September 1920, the demand decreased to a certain extent. The people who have been buying the used car have been affected by existing conditions more than any other class. Though they have money in the bank, they have been uncertain lately about working conditions, and they are not doing their share toward keeping up the used car market.

The action of manufacturers in reducing prices, has helped greatly to solve the used car problem, which not long ago was cutting in so deeply on the commerce in new machines. Price reductions have helped to increase sales; it was just the stimulation that was needed.

At the Franklin, Cadillac, Packard, Buick and Hudson and Essex agencies similar reports were made. The "comeback" of the professional and office men as money earners also was given a full share of the responsibility for increased sales of cars fresh from the factories."

An example of what comes with each price reduction was given at the Chevrolet sales agency, where 47 new cars were sold in the first month following the last price reduction. The Studebaker agency reported a record that was ahead of sales for the corresponding month a year ago.

The decline in the demand for used cars is evidenced by the efforts being made by dealers to dispose of them. For the first time in years, the dealers are merchandising along the lines pursued by the big department stores. They have bargain days that are announced in advance. Special prices are arranged for these days. A special guarantee of service for a definite period is but one of the many means adopted to get the used vehicles on the move.

CLOSES TRAVEL BUREAU

The Goodrich Travel and Transport bureau which has been maintained for years and which has laid out for motorists, motor routes throughout the entire world, will be discontinued temporarily. A. G. Stevens has been in charge of the bureau.

Lewis-Hall Refuses Plan of Truck Sales Managers

Ackerman Resigns from Board of Directors and Withdraws Company from Membership

DETROIT, June 18—After receiving from the board of directors of the National Association of Motor Truck Sales Managers a note informing him that they had adopted a motion "protesting against indiscriminate selling of motor trucks to fleet owners direct from the factory," W. K. Ackerman, vice-president and general manager of the Lewis-Hall Motors Corp., sent the following reply to Don F. Whittaker, the executive secretary:

"Yours of the 11th ultimo, "Protesting Against Indiscriminate Selling to Fleet Owners at a Discount as Being Thoroughly Subversive to the Best Interests of the Motor Truck Industry" and requesting that such policy be discontinued, received. In reply, would state that, inasmuch as the policy of selling direct to fleet owners has been definitely decided upon by us and will be continued by us, not indiscriminately, as you state, but with due respect to the prospects' standing, the only graceful procedure on the writer's part is to tender his resignation, for immediate acceptance, as one of the board of directors, and to discontinue this company's membership to the N. A. M. T. S. M.

Proceeding With Sales Effort

"This company and the writer are proceeding with sales effort not unlike other manufacturers, the only difference being that we are not camouflaging our dealer in any way, yourselves nor ourselves, and have been frank, honorable, aboveboard, and in the open in our efforts so as in no way to represent ourselves to our associates as other than we really are. As to the fairness to our dealers, would state that we have their written acceptance to our plan by contract or otherwise.

"This decision was arrived at only after careful discussion and due consideration here. As discussed with Mr. Whittaker, the plan upon which we are working to a sales end with the fleet owners is common with other of the largest manufacturers of motor trucks, as is evidenced by the fact that many of the fleet owners now have in their possession contracts with those manufacturers for the sale of motor trucks to them direct from the factory at varying wholesale prices.

"It has been intimated, too, that one of the local manufacturers has withheld membership to our association owing to the fact that one of the members of the board of directors was in favor of a sales policy not in accordance with his line of thought. We have, however, reliable information that the local concern is proceeding in their local sales without a dealer, on a factory direct plan, and at wholesale prices—not only to fleet owners, but to general users.

"This company values the work of the sales managers association very highly and the writer has likewise enjoyed the association of the board members, but, inasmuch as Mr. Hall and the writer, on behalf of the motors corporation, are averse to anything but frankness to our fellow associates and companies belonging to the association, we feel that, with respect to your objections, the only course to pursue is this one of resignation."

Reclassify Truck Shipments West of Mississippi River

New York, June 16—The chairman of the western classification committee has advised the National Automobile Chamber of Commerce of favorable action on its request for reclassification of motor trucks and chassis when shipped in carload lots to points west of Chicago and the Mississippi river. In an early supplement to the classification, the item now reading "Automobiles, Freight, set up, loose or in packages, carloads, 1st class," will be changed to read 2nd class. The item which now covers "Chassis, loose or in packages, in carloads, 1st class," will also be changed to 2nd class.

The saving in freight charges on a 15,000 pound load of trucks amounts to $35.25 on shipments to Kansas City or Omaha; $68.25 to Dallas, Galveston and Houston; $88.50 to Denver; other western points in proportion. Pacific coast rates are not changed, the special rates to that territory having been continued in effect by the decision in the Trans-Continental case.

FOUR MORE LOWER PRICES

New York, June 18—Price reductions have been made on Wasp, Pilot, Climber and Beggs cars.

The Martin Wasp Corp., Bennington, Vt., will reduce its 4-pass. model $6500 to $5500.

Pilot Motor Car Co., Richmond, Ind., has reduced its coupe from $3600 to $3350 and the sedan from $3600 to $3400.

Climber Motor Corp., Little Rock, Ark., has reduced its Climber 4 roadster from $1550 to $1450; the 5-pass., $1550 to $1385; the Climber 6 roadster from $2750 to $2250, and the 5-pass. $2750 to $2250.

Beggs Motor Car Co., Kansas City, Mo., has reduced its roadster and 5-pass. models from $1885 to $1775; its coupe from $2785 to $2675, and its sedan from $2885 to $2775.

DENIES PRICE GUARANTEE

A statement appearing in the May 26 issue of MOTOR AGE, to the effect that buyers of Stephens cars are guaranteed the present list prices until Jan. 1 seems to have been without authorization from the factory and is denied by the Stephens Motor Works.

Kansas Business Conditions Generally Good For Dealers

Influenced by Reduced Prices Sales Have Been Boosted to Satisfactory Figures

TOPEKA, Kan., June 13—Business in Kansas is largely a matter of what the dealers make it. Live dealers everywhere are selling cars, and this does not mean necessarily dealers in cars whose prices have been slashed in the present reductions. There appears to be business where it is properly gone after even in the oil producing section of the state which is now in considerable of a slump due to low crude prices.

General business in the northern part of Kansas is in better condition than in the southern oil territory. Whatever sales resistance there is in this secton is being dispelled by the live dealers. There are some complaining of lack of business and a few who speak of getting into some other line after July 1, but most dealers are keeping busy.

Wheat is in good shape in practically all sections of the state but there will be no definite reactions based on the crop until after the harvest which starts within two or three weeks. Business in Kansas is bound to be better after the harvest. It always was before and it will be now.

Price reductions seem to have had a greatly beneficial effect in all towns. Dealers are going after business greatly encouraged by the price argument and are closing sales which were impossible under the old prices. Many buyers were known to be merely waiting for the reductions and their closing was a mere matter of form. One dealer whose weekly sales average was two, sold fourteen in the first week after his car was cut.

The morale of dealers as a whole is good. There has been some discouragement from various causes during the past few months but they have been holding on well and are now regaining their former pep. Dealers after this year's experiences will be real merchants in 1922 and this will be a fortunate development for the industry.

SHANNON IS NOT DEAD

The frequent attempts of his friends to poke the glad hand through his shade is embarrassing to Elmer T. Shannon, Milwaukee racing driver, who was reported to have died as the result of an accident at the Indianapolis race in 1919. Shannon declares that it is difficult enough to live these days without being tickeled almost to death by old familiar and friendly fingers curiously digging around over and into his earthly form when it appears at a race track or in any other environment. Shannon's friends say they have been glad to have him with them in any form, but are especially pleased to know that he is not dead. Hereafter no obituary of Shannon will have any authenticity whatever unless "dictated and read" by Shannon himself.

Price Changes in Current Models

Car	Model	Old	New
Allen	Tour.	1395	1385
	Sedan	2395	2195
American	Sedan	3495	3150
	4-Sport	2595	2350
	7-Tour.	2475	2275
	5-Tour.	2395	2195
	Road.	2395	1195
Beggs	Road. & Tour.	1685	1775
	Coupe	2785	2675
	Sedan	2885	2775
Birch	Road & Tour.	1595	1595
Bour Davis	Road.	2585	2385
	7-Pass.	2585	2385
Brewster	Road.	7900	7000
	Tour.	9000	7000
Buick	41-47 Road.	1795	1495
	Tour.	1795	1525
	Coupe	2585	2135
	Sedan	2895	2435
Chalmers	Road. & Tour.	1795	1545
	Coupe	2595	2295
	Sedan	2745	2445
Chandler	Road. & Tour.	1930	1785
	Coupe	2930	2785
	Sedan	3030	2885
Chevrolet	490 Road.	795	635
	Tour.	820	645
	Coupe	1325	1185
	Sedan	1375	1195
Cleveland	Road & Tour.	1465	1295
	Coupe	2375	2195
	Sedan	2475	2295
Climber	4-Road.	1550	1450
	4-Tour.	1500	1385
	6-Road.	2750	2250
	6-Tour.	2750	2250
Columbia	Road.	1945	1795
	Tour.	1995	1795
	Coupe	2895	2495
	Sedan	2895	2595
Cunningham	Prices on application		
Dixie Flyer	Tour.	1595	1445
	Coupe	2570	2295
	Sedan	2570	2345
Dodge	Road.	1235	935
	Tour.	1285	985
	Coupe	1900	1585
	Sedan	2150	1785
Dort	Road. & Tour.	1215	1115
	Coupe	1865	1685
	Sedan	1995	1835
Elgin	Tour.	1775	1495
	Coupe	2795	2395
	Sedan	2795	2395
Essex	Road.	1595	1445
	Tour.	1595	1445
	Coupe	2100	1950
	Sedan	2450	2300
Ford	Road.	395	370
	Tour.	440	415
	Coupe	745	695
	Sedan	795	760
Franklin	Tour.	2700	2550
	Road.	2800	2650
	Coupe	2950	2850
	Sedan	3850	3650
Gardner	Road. & Tour.	1195	995
Hudson	Tour.	2400	2250
	Coupe	3275	3125
	Sedan	3400	3250
Hupmobile	Road. & Tour.	1685	1485
	Coupe	2725	2400
	Sedan	2800	2485
Jordan	M Road.	2650	2250
	Tour.	2650	2250
	Coupe	3700	3300
	Sedan	3700	3300
Kissel	Coupe	3875	3375
	Sedan	3875	3375
Lafayette	Road. & Tour.	5625	4850
	Coupe	7200	6250
	Sedan	7400	6500
Lincoln	Road.	4600	4300
	Tour.	4600	4300
	Coupe	5750	4950
	Sedan	6000	5400
Marmon	Tour.	5000	3985
	Town car	6800	5400
	Coupe	6150	4875
	Sedan	6600	5275
Maxwell	Tour.	995	845
	Coupe	1595	1445
	Sedan	1695	1545
Mitchell	Road. & Tour.	1750	1490
	Coupe	2800	2590
	Sedan	2900	2690
Monroe	Tour.	1440	1295
	Coupe	2400	2075
	Sedan	2500	2175
Norwalk	Tour.	1285	1135
Oakland	Road. & Tour.	1395	1145
	Coupe	2065	1815
	Sedan	2065	1815
Overland	Road. & Tour.	895	695
	Coupe	1425	1000
	Sedan	1475	1275
Paige	6-66 Tour.	2895	2875
	Coupe	3775	3755
	Sedan	3850	3830
Piedmont	4-30 Tour.	1395	1270
	6-40 Tour.	1795	1495
Pilot	Tour.	2285	.....
	Coupe	3600	3350
	Sedan	3600	3400
Raleigh	Road. & Tour.	2750	2250
	Coupe	3600	3100
	Sedan	3700	3200
Saxon	Tour.	1675	1495
	Coupe	2475	2295
	Sedan	2475	2295
Scripps-Booth	Road.	1545	1275
	Tour.	1545	1295
	Coupe	2215	1950
	Sedan	2295	2100
Seneca	Road.	1185	1045
	Tour.	1185	1045
Sheridan	Road. & Tour.	1685	1485
	Coupe	2565	2265
	Sedan	2765	2465
Stanley Steamer	5-Phaeton	4200	2900
	7-Tour.	4200	2900
	Coupe	5950	4100
	Sedan	6100	4250
Studebaker EH-50	Road. & Tour.	1750	1585
	Coupe	2650	1635
	Sedan	2750	2450
			2550
Templar	Road.	2885	2385
	Tour.	2885	2385
	Coupe	3785	3185
	Sedan	3785	3185
Wasp	Tour.	6500	5500
Willys-Knight	Road.	2195	1895
	Tour.	2195	1895
	Coupe	2845	2550
	Sedan	2945	2750

HOW THE ELECTRIC SYSTEM WORKS

(*Concluded from page 21*)

when the distributer brush hits the segment, to which the spark plug wire is attached, and that this contact with the segment produces the spark.

Now it is of course true that the brush should be on a segment when the spark occurs, but the spark voltage is produced by the opening of the interrupter points, and exists, whether the brush happens to be on or off of a segment.

The difference between the function of the interrupter and the distributer can

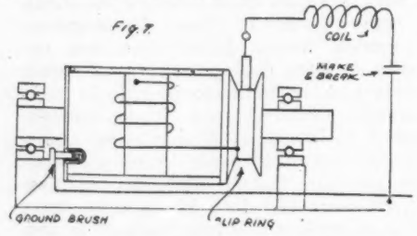


Fig. 7—Showing armature of magneto for make and break ignition system with ground brush to carry returning current

be compared to the difference between a factory and a sales office; the factory makes the thing and the sales office takes care of distributing or marketing it. So the distributer on the magneto must deliver the sparks to the different plugs, but the interrupter determines the exact time of firing.

To set the distributer properly, the interrupter should be advanced, rocked against rotation. The correct rotation should have been determined as previously explained. Then the armature should be turned until the interrupter points just start to open, and at that instant the distributer brush should just have attained a full contact with the segment, but should not have advanced any appreciable distance across the segment.

Article XII Next Week

REPORT FAVORS TOWNSEND BILL

Washington, June 18—Highway legislation advanced another step when the Senate Committee on Postoffices and Post Roads reported out the Townsend bill without vital changes. An effort will be made to expedite its passage through the Senate this week.

The bill as reported out, represents the views of the majority of the members of the Senate Committee on Postoffices and Post Roads. It is indicated that a minority report may be submitted later because of the insistence of one or two democratic members on the continuation of Federal aid.

The House Committee on Postoffice and Post Roads will begin a study of the Phips-Dowel bill, which is similar to the Townsend bill. The principal opposition to this highway legislation is developed when one or two small groups of organized farmers demand farm-to-market roads.

SEIBERLING'S ASSETS $10,000,000

Akron, June 18—Assets of Frank A. Seiberling, former president Goodyear Tire & Rubber Co. are listed at $10,136,570 and his liabilities at $6,700,000 in an agreement between Seiberling and creditors. Seiberling will transfer all his assets to the Prudential Securities & Realty Co., which is to be formed to manage the property and protect the equities. Securities listed among his assets are practically all of a local character and include $2,000,000 Goodyear preferred stock. Seiberling's home is not listed among the assets.

OVERLAND MAKING 300 A DAY

New York, June 18—The Willys-Overland plant at Toledo is now turning out cars at the rate of 300 a day but orders are running far in excess of present production and there are approximately 7,000 on hand. This will keep the factory going until the middle of July. The force now numbers 7,000 men and several hundred more will be taken on before the end of June.

Data Drouth Brings Truck Flood

Lack of Information from Authoritative Source Cause of Senate Action on Reconstructed Trucks

NEW YORK, June 18—Business in reconditioned army trucks brough back into this country by the Truck Company of America, is reported by officials of the company to be well up to expectations. Arrangements are being made by I. Edward Roskam, one of the officers, now in Europe, for the purchase and shipment of a considerable number more.

The first of the trucks brought back, numbering about 2,000, were principally Pierce-Arrow, Mack, Packard, Peerless, White, Riker, Locomobile, Liberty, F. W. D., Nash and G. M. C. These were bought from the Slough Trading Co., Ltd., of London, and it is presumed that the trucks now being bought will be from the same source.

Parts for the trucks are now being brought in, according to Louis Mansback, an officer of the company. These will total in value about $100,000 and it is probable, he said, that more would be arranged for on Roskam's present trip.

Sales of the reconditioned trucks are principally in the New York and Chicago districts, Mansbach said, though the distribution is extending to all parts of the country except through the south. A Chicago office has been opened under the direction of Morris Froolich, also an officer.

Additional storage space has been arranged for in New York by the leasing of the old car barns on Tenth avenue, giving the company a total of about 250,000 feet of storage space in New York.

TO INSERT VALUATION CLAUSE

Washington, June 18—Protests by motor truck manufacturers and dealers against the serious effect upon their business which will follow continued reimportation of American made vehicles from England and France, is having its effect upon Congress. Representative Fordney, chairman of the Ways and Means Committee of the House, has indicated that when the permanent tariff is framed adequate protection will be given the automotive industry by the insertion of a specific clause in the anti-dumping provisions of the measure.

Leaders in the lower house are disposed to recognize the justice of the contention that this competition in the truck field is unfair and the same is true of Senate leaders such as Senators Smoot and Ball.

The truck industry itself and the organizations connected with it, were slow to awaken to the seriousness of the situation and it is no secret that if Congress had been informed of the actual facts some such clause as it now sought might have been included in the anti-dumping provisions of the temporary tariff which was passed a few weeks ago.

Senator Smoot, who was especially interested in the subject and who is thoroughly alive to the essential nature of the truck industry, was unable to get the data he sought from any source he could recognize as authoritative.

No attempt will be made to bar out of the country these American made trucks, but it is proposed to enact valuation clauses which will put them on a fairly competitive basis. The chief danger now is that so many of them will be brought into the country before the permanent tariff is enacted that it will be a case of locking the barn door after the horse is stolen.

It is expected, however, that the Ways and Means committee will report the permanent tariff bill in a few days. Practically all legislation is at a standstill pending solution of the tariff question.

LANDING FIELD AT KOKOMO

Indianapolis, June 18—The Curtiss-Indiana Co. has secured a twenty-year lease of 100 acres of land one mile south of the old aviation field at Kokomo, which is to be one of the largest and best equipped commercial aviation fields in the United States. Planes approaching from any point of the compass will be able to land with absolute safety as every foot of the ground is free from ruts and bumps and ditches, and there are no trees or wires which hinders successful landing of airplanes. The standard marker has been laid out in the center of the field, this being a white circle 100 feet in diameter enclosing a white cross 60 feet in diameter, and is visible from any height that a plane may be flying. Eleven of the 29 airplanes on the new field are ready for flying. These planes are all of various types and sizes.

Anti-Dumping Law Comes Too Late

Officials of Truck Company of America report sales of reconditioned trucks are up to expectations.

Main distribution points are in Chicago and New York.

Senator Smoot says truck manufacturers were asleep when legislation was enacted, leaving dealers unprotected.

Valuation clause will be inserted in law to stem tide of reimported machines.

California Registrations Show 25 Percent Increase

Sacramento, Calif., June 18—A gain of more than 25 per cent is shown in the automobile registrations of 1921 over those of 1920 in the first four months of the year.

For this period in 1920, there were registered 421,982 automobiles, as against 340,359 this year; there were 29,336 trucks last year in the first four months, and 30,757 this year; trailers numbered 1,699 last year and 2,456 this year. Motorcycles show a decrease, with 14,427 this year against 16,243 last year. The registration fees in the first four months totaled $6,042,150 this year, a gain of $1,161,439 over the similar period last year, which returned to the state $4,880,713.

The figures for the first third are the heaviest of any like period of the year, but they indicate the revival that has come in the automobile trade the state over. Those registrations are spread over the entire state, whereas last fall the new car licenses were issued almost entirely in the grape-growing districts. Now, however, the wage earner is buying as before, and the year's registration will exceed that of 1920 by 50 per cent, Chenu estimates.

GOOD CROPS PROMISE SALES

Bloomington, Ill., June 18—Price reductions, so radical and general, lately announced by automobile manufacturers, have given the industry just the stimulation that was needed in central Illinois, and the car buying public in this section immediately responded with a generous flood of orders. The situation here is also aided by the splendid crop outlook. Wheat has never given greater promise. Oats will yield above the average, should weather conditions continue as favorable, while corn has never appeared better at this time of the year. This encouraging condition has stimulated buying among the rural prospects and it is now believed that the "farmers strike" will soon be officially declared off. When this occurs, the tractor industry will also feel a revival.

Concerning Men You Know

Richard Harfst has been made general manager of the Detroit branch of the Cadillac Motor Car Co., succeeding W. H. Collins, who has joined his father, R. H. Collins, in the latter's new project. For the last year Mr. Harfst has been in the office of the president of the General Motors Corp. in New York, from which position he resigned to join Cadillac.

A. K. McLuney, who left Buick Motor Company ten years ago to become Detroit Manager of the Studebaker Branch and later was a Buick dealer at Utica, N. Y., has returned to Buick, where he is connected with the sales department at the factory.

Verne E. Burnett, who has been assistant to Cliff Knoble, advertising manager of the Liberty Motor Car Co., has resigned to join the advertising staff of the Cadillac.

H. C. Bradfield, of Detroit, has been appointed director of sales and advertising for the Yellow Cab Manufacturing Co. of this city. Mr. Bradfield has been president and general manager of the Bradfield company, Detroit, has discontinued his Detroit business and is now with the Yellow Cab Manufacturing Co. Associated with Mr. Bradfield as sales managers of the taxicab division of the company is J. B. Dub, who was formerly associated with Mr. Bradfield with the old Premier Motor Car company of Indianapolis.

C. J. Reilly, for several years connected with Firestone and Akron, as sales representative, has been made sales manager of the Simplex Auto Lock Company, Detroit. He assumes his duties tomorrow.

J. H. Newmark for 11 years with General Motors, recently as advertising manager of the Chevrolet division, has been promoted to assistant manager of sales and will come to Detroit when the Chevrolet organization moves to its headquarters in General Motors building July 1.

James O. Mumby, formerly sales manager of the Central Iowa Motors Co., of Des Moines, Iowa, has assumed managership of the retail Department of the Millsap Motor Co., of Cedar Rapids, distributors of the Hupmobile, Chandler and Cleveland.

Roy H. Palmer, president and treasurer of The Palmer Motor Sales Corp., New London, Conn., is president of the newly-organized Aero Transportation Co. of that city, a corporation formed to finance and manage seaplane flights at Ocean Beach in the outskirts of New London.

W. G. Bell, former president of the Cleveland Tractor Co., of Canada, has been named director of sales of Gray-Dort Motors, Limited, of Chatham. Mr. Bell brings to his new duties a particularly extensive automotive experience. Gray-Dort Motors also has named Johnson R. McGee as sales manager. Mr. McGee has been with the Gray organization for thirty years and has earned this promotion by his unfailing loyalty and energy. His work in the sales department has made him well known in the motor car business throughout Canada.

Kent Gear Co., Denver, has opened an eastern branch office at 236 West 55th street, New York, with H. Loomis Hull as manager.

The Moon Motor Car Co. has declared the regular quarterly dividend of 1¾ per cent on preferred stock outstanding, payable July 1.

Harold B. Larzelere, vice-president and general manager of the Vim Motor Truck Co., says that the plant is now working at about 20 per cent of capacity and producing 14 trucks a day. About 300 persons are employed at the plant and the outlook for increased business is especially good.

George P. Hoover and his father, James H. Hoover, have purchased the Reisinger Motor Co., of Uniontown, Pa. The sale includes a modern building erected two years ago. The company has a Ford automobile and Fordson truck agency. The consideration of the sale is reported to be in excess of $150,000.

Arthur R. Heiskell, who has been connected with the Nordyke & Marmon Company here as treasurer for number of years, and H. G. Shafer, who has been secretary of the same company have been named as vice presidents of the company. H. L. Purdy, formerly assistant treasurer, will succeed Mr. Heiskell and H. R. Rice, formerly sales manager, will take Mr. Shafer's place. H. H. Brooks, assistant sales manager, has been promoted to take the place made vacant by Mr. Rice and A. J. Rogers, publicity manager for the company has been promoted to assistant sales manager.

Earl W. Showalter, Chester Martin and **Wallace Walls,** of Indianapolis, automobile men, have organized the M. & S. Radiator Co. which will begin manufacture of special radiators and will do repair work on radiators.

H. J. Wocher, T. P. Troke and **T. D. Stevenson,** of Indianapolis, have organized the Tour-O-Truck Body Co. with a capital stock of $100,000. The company will manufacture bodies specially designed for long haul trucks.

Edward J. Mueller is new director of sales with the Cleveland Motorcycle Mfg. Co., Cleveland, O. Mr. Mueller has been connected with the motorcycle business eleven years.

M. S. O'Brien has joined the Milwaukee-Paige Co., Milwaukee, Wis., as manager of retail sales in Milwaukee and vicinity. He has been connected with Milwaukee distributors and dealers for about seven years.

North Carolina Tax of $500 On Manufacturers Stands

Raleigh, N. C., June 16—The state license tax of $500 on manufacturers of automobiles stands in spite of the opinion of the United States Supreme Court, recently handed down to the effect that section 72 of the North Caroline Revenue Act of 1917, relating to the tax, is unconstitutional. This is the opinion of State Assistant Attorney General Frank Nash, after learning of the Supreme Court decision. The 1917 act contained two provisos, making the tax only $100 on certain manufacturers. Those that came under the provisos were manufacturers paying taxes on their plant in the state, and those that invested three-fourths of their assets in state bonds, or municipal bonds of the state. These two provisos the Supreme Court held unconstitutional as discriminatory against non-resident manufacturers.

Anticipating such an opinion, the legislature of 1921 incorporated a provision in the revenue act that if any part of any clause or section of the revenue act should be declared unconstitutional the remainder of the clause or section should remain in force. Under this provision the decision then simply has the effect of raising the tax on the state manufacturers to $500, and not nullifying or lowering the tax on the outside manufacturers.

Suit which resulted in the Supreme Court decision was brought by the Bethlehem Motors Co. and the National Motor Car Vehicle Co.

NEW PRICES STIMULATE TRADE

Toledo, June 17—A substantial improvement in the automobile industry is shown in the June schedules of several local factories. The Willys-Overland Co.'s output this month will be more than doubled with enough orders already received to take up the whole month's production.

Notice has been sent out that no enclosed car models could be delivered before June 20. The price reduction has greatly stimulated business.

The production of automobile equipment at the plant of the Electric Auto-Lite Corp. will be increased by 20 per cent in June, Clement O. Mininger, president, announced this week. The May production at the plant was 20 per cent greater than in April. There are now 1,027 employes at the Auto-Lite plant here which compared favorably with a normal force of about 3,000. President Mininger says that orders received during the last week from many companies which have reduced prices on their cars shows that the lowering costs are stimulating business beyond the expectations of the manufacturers. He does not expect the usual summer sag to come this year.

Volume of Business Increased

George D. Moore, general manager of the Toledo Chevrolet plant, said that nearly 200 employes had been brought back into the plant in the last week and that the force is to be doubled this week. This increase is largely on the strength of the increased volume of business which the Chevrolet distributors have noticed since the announcement of price reductions. The Chevrolet company manufactures only differentials and transmissions here. The company has had a large stock of these parts on hand in its assembling plants and in the hands of agents so that necessarily the local plant has not been speeded up as much as the actual production would indicate. There were nearly 1,200 employes at work in the Chevrolet plant in the peak periods.

The daily drive-aways of 100 to 150 cars from the Overland plant has recalled the pre-war days. There are also many carloads leaving the city by rail every day to more distant points of distribution. Several boatloads have gone to Buffalo in the last few weeks for the eastern states demands.

June Production at Maximum Speed

The June production is to be at its maximum speed by June 15, according to Vice-President Charles B. Wilson. He says the actual output of cars for June is to be 112 per cent of the number produced in May. The plant payroll will be increased by about one-third so that there will be 8,500 employes at work the last week in June.

One of the most difficult problems for the factory to face at the present time is the task of getting materials delivered in time to keep up with production. Supplies have been coming so slowly for several months that in many cases it is difficult to get the necessary speed up on short notice.

The factory has gone into full time operation. For several weeks it has been on a four-day week basis but now the output of every man every day is needed to keep up with the orders. The employment office has indicated that practically every old Overland employe that could be located has been recalled and that from now on the positions will be open for new men.

Better Business
Money-making Ideas

A dollar will be paid for all ideas accepted as Better Business—Perhaps you have some.

A Picture That Arouses Pride of Ownership

Does your prospect know how his home would look with one of your closed cars setting in front of it? A prospect of Thornton-Fuller Automobile Co., Dodge dealers, in Philadelphia, often gets a nice picture of his home with a Dodge sedan with his initials on it setting in the foreground. Within twenty-four hours a salesman will call and invite him to take a ride in the car. The pictures are not very expensive and the initials are put on the negative by the engraver in the studio. The picture starts him to thinking and the salesman finds him in excellent frame of mind for an interview.

Prompt Service Wins Customers' Good Will

The Columbus Buick Co., of Columbus, O., in its plan of improving its business methods has instituted a system in the service station of notifying owners by phone when their cars left for repairs, are finished. In other words if an owner drives in at 8 a. m. asking for certain repairs or adjustments and wanting the car at 4 p. m., and the work is completed previous to this hour, the telephone operator notifies the owner of the fact. Often the owner is in need of the car and the notification is the means of saving his time—thus creating good-will—which is a feather in the cap of the service department. This has been tried for several months with success.

Makes Sales By Doing Favors

An interesting and effective way of making prospects feel as though they must purchase cars of the dealer is to put the prospects in debt to the dealer. A never-failing way of doing this is securing tickets to a movie theater when a good automobile film is being shown, and sending these to the prospect with a letter reading about like this:

"Dear Mr. Smith: You'll be interested in the automobile film at the Grand theater tonight. This film gives a splendid idea of the joys and benefits of motoring. We'd be glad to have you see this film and are enclosing with our compliments a couple of tickets for this theater, good for the time this film is being shown. Also we'll be glad to have you drop into our place of business and talk over motoring topics with us."

Most of the tickets would be used, and all those prospects who used them would feel like coming to the dealer and thanking him for sending the tickets. And from this point it would be an easy matter to work up sales.

Classified Ad Brings Results

An Indiana dealer keeps a classified ad running in the local papers reading about like this:

"RUN LESS THAN 500 Miles. Practically new Whizzer car at $100 less than regular price."

Every now and then this ad brings an inquiry to the dealer. And then the dealer either sells the prospect a demonstration car or talks him into buying an entirely new car. This method of getting prospects is so cheap and effective that it might be used by other dealers.

Unique Advertising Gains Customers

If the accessory dealer would place a searchlight on his roof and direct this light straight upward each night, it would attract a lot of attention. And he might then advertise as follows:

"WHEN YOUR SEE THE SEARCHLIGHT, THINK OF SMITH AUTO ACCESSORY STORE.

"Each evening our searchlight flashes upward. And each day and evening we are ready to serve you with the largest and most complete line of accessories in the entire city.

"Just as our store is the most up-to-date in the way it advertises, it is also the most up-to-date in its goods and service. We are always turning the searchlight on our goods and our service in order to keep our goods of the sort demanded by our customers and in order to always make our service absolutely satisfactory.

"Purchase your accessories at the Smith Searchlight Store."

A plan of this sort need be continued for only a month or two in order to get everyone in the city talking about the store. And when everyone in a city talks about a store, that store profits accordingly.

Profits by Advocating Full Insurance

Every automobile dealer should try to have his car purchasers carry a full line of insurance. This is as much for the dealer's benefit as for the benefit of the car owner. When an owner loses his car through theft or fire and has no insurance, he seldom feels like buying a car immediately and, if he does buy another car, he generally buys the cheapest, good used car he can buy. But if the car owner has insurance and then loses his car, he at once feels like patronizing the dealer who did him the good favor of getting him to take out insurance. So it is very evident where the dealer would profit.

Arouses Prospects to Action With Telegram

A good way of getting action from prospects who want cars but who are timid or backward about closing, is to send them telegrams. A telegram always gets some sort of reply from the person who receives it, and if the dealer would send telegrams to these prospects, timing them so that they would reach the prospects early in the evening, the receipt of the wires would make a very deep impression on the recipients and be of distinct aid in closing. And, of course, as the telegrams would be sent but a short distance, the cost of sending them would not be very great. It might be a good plan for the dealer to have the wires sent to the prospect from some nearby town and to have the wires read like this:

"Prospect here may buy car you want. Immediate action on your part necessary."

Such an idea would be so entirely different from the usual sales stunts that it would be certain to make the prospect take some immediate action.

Assuring Public on Tires It Buys

There are numerous places in Hartford where so-called first quality tires are sold at prices away below cost. These places bite into the old line dealers. One dealer arranged a stock of tires in his window with the following legend in big letters: "Buy a legitimate tire from a legitimate dealer."

Automotive Architecture

Planning & Building Problems

Conducted by Tom Wilder

Building With Brick

WHEN we say brick building we immediately think of a building built of small rectangular pieces of burned clay cemented together with mortar. There is no idea conveyed of color or texture because brick is made in an infinite number of these qualities. Colors range from white through the buffs, yellows, reds, purples and blacks, blues and greens being the only ones not found in nature. The textures of the different specimens depend on the method of forming, the quality and intensity of the burning, and the nature of the clay from which they are made.

Nature does most of the compounding of clays that are used in the manufacture of brick, and she does an exceedingly good job furnishing clays with all the necessary ingredients including coloring matter. There are clay deposits of the greatest variety, any of which can be formed into some certain kind of brick; and again there are clay banks which are stratified in layers, each individual layer of which will burn into a different brick.

In cases like the last mentioned, the strata are sometimes carefully separated, while at other times they are mined by cutting across the layers so that a proportional amount of each layer is taken and the whole thoroughly mixed to form brick of one quality only.

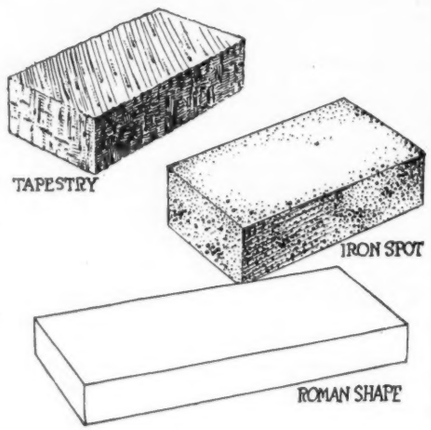
Presence of Iron Oxides Important

It is a peculiar fact that practically all brick depends for its color on the presence of iron oxides. The bright reds, the deep purples and blacks, the browns, the buffs and yellows are caused by the presence, in varying quantities, of iron; the two latter colors are the result of the presence of lime.

It is another peculiar fact that it is impossible to get bright reds by the addition of iron oxide to the mixture, and experts disagree as to the reason. There is something about the intimate natural mixing that gets the results which are not attainable by artificial means.

All bricks are made, with variations, by one or two processes. In the so-called stiff mud process the clay is mixed with water in mixing machines until it is thoroughly plastic but stiff enough to hold its shape and stand handling. The clay, after being mixed, is forced out through dies and cut off by fine piano wires being drawn through it.

The more inferior quality, called common brick, is usually end cut, while the higher grade face brick are side cut so that all the exposed surfaces will be smooth and perfect. In the dry press process the clay is not mixed with water but is ground and mixed thoroughly in the dry state and then moistened with just enough water to make it stick together in a lump, when pressed. This moistened material is then pressed into steel dies under hydraulic or other intense pressure.



Showing the method of forming end-cut and side-cut stiff mud brick. The holes are not always present but are principally to lighten the brick thus reducing freight charges.

The two processes are sometimes combined; the bricks after being formed from stiff mud are allowed to partially dry and are then subjected to "repressing" which makes a particularly dense and fine quality brick.

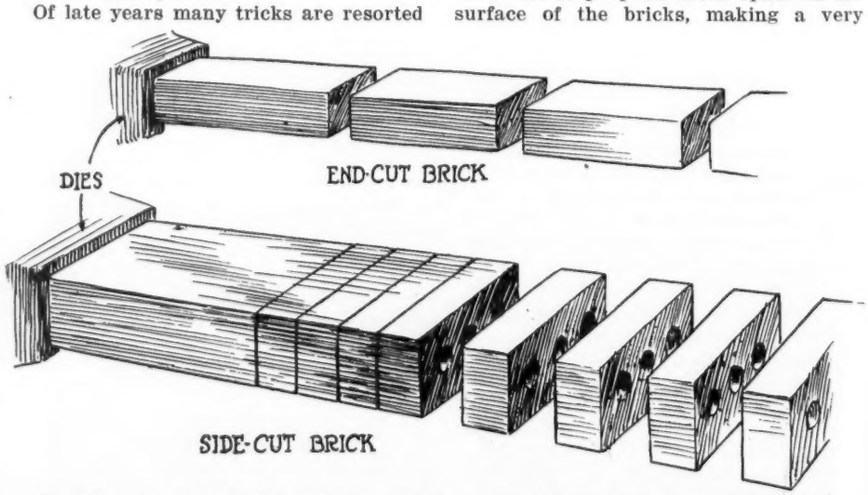
Of late years many tricks are resorted to in getting novel surfaces such as those of tapestry brick. They are roughened by scratching and cross scratching when partially dry; they have coarse ground clay of a different sort sifted on them, while soft, and partially rolled in; they are sprinkled with materials that will melt and show speckles of various colors; they have sawdust or coal mixed with the clay which burns out leaving them porous, etc.

The colors of brick are intimately affected by the firing they receive. Bright reds, especially, are very elusive and require the most careful watching. Should the gases in the kiln change from an oxidizing condition to a reducing, the red would immediately disappear.

Many clays are burned in a reducing flame until nearly finished, and then oxidized. This treatment gives a brick with a black, purplish or dark brown core having a layer of red on the outside. Mottled reds and blacks are caused by streaks of free air introduced at the end of the burn, which has been mostly reducing.

Brick does not come out of the kiln all alike, but the different colors must be sorted out and matched up when the brick is removed. If reds are being burned, some sections of the kiln will be a fine red color, while others will be any shade to dark brown or even black. "Kiln run" is the term applied to the unsorted brick just as it comes from the kiln.

Clay often contains quantities of small granules of iron sulphides, which fuse to brown or purplish black spots on the surface of the bricks, making a very



A stiff mud tapestry brick, a dry pressed iron spot brick and a roman shape which is 12 inches long and only two-thirds the thickness of a standard brick

attractive appearance when occuring in a buff or light colored clay.

The intensity of the fire is another condition affecting the quality of brick, though this is primarily determined by the clay. Clay is made up of variously impure ingredients formed in past ages from the decomposition of feldspar and other rocks containing aluminum oxide, quartz, soda, and potash. The soda and potash are the fluxing ingredients which fuse with the quartz and allumina into a glassy compound which hardens when cool.

Many other fluxing ingredients are present in brick clays, especially iron, lime and magnesia, and in proportion as their volume increases the firing temperature of the clay will be reduced.

Clays with too much flux, especially lime, are not suitable for high grade brick, because they warp and soften out of shape and, if slightly overfired, the bricks will fuse into a solid mass.

Vitrified brick is that in which the flux has permeated them as to such an extent that it is solid and non-absorbent. Whether the brick fires at a high or low temperature is determined by the nature of the flux.

Plan 342

A DRIVE-IN FILLING STATION

We contemplate the construction of a modern garage and accessory store with a drive-in filling station on a lot 97 by 200 ft. The building is to be large enough to store about 15 cars, with separate rooms for mechanical work, tire work, battery work and paintshop. Will also want a ladies' rest room, mens' toilet and shower. The lot is located on a corner with the 97 ft. facing the principal street. If possible, we would like to have show windows on the main street as well as show windows facing the gasoline pumps. This building will constructed of brick and will be one story.—Bonnet Auto Top Co., New Iberia, La.

We hardly know what to do with all the space at our disposal as you make no mention of the size of your departments with the exception of a show window for one car and car storage space for 15 cars.

This request is very unusual since 50 cars could be provided for without sacrificing shop space and show window expense could be provided for three or four or several cars.

We think perhaps that you do not intend to cover the entire lot but have not given us to understand as much. We have "split the difference," so to speak, between covering the whole lot and meeting what appears to be your requirements.

Our gasoline station layout is rather novel in that it takes very little room. Cars may drive in, fill and drive out through the garage. If the garage is closed at night, the cars may back out. This little court may be covered or left open. If covered, there should be enough glass in the roof to allow plenty of light to illuminate the accessory display which is well arranged to get the attention of the gasoline purchaser.

Automotive Architecture

IN this department MOTOR AGE aims to assist its readers in their problems of planning, building and equipping, se civrtseshrdlutaoishtrdn equipping, service stations, garages, dealers' establishments, shops, filling stations, and in fact any buildings necessary to automotive activity.

When making requests for assistance please see that we have all the data ncessary to an intelligent handling of the job. Among other things we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

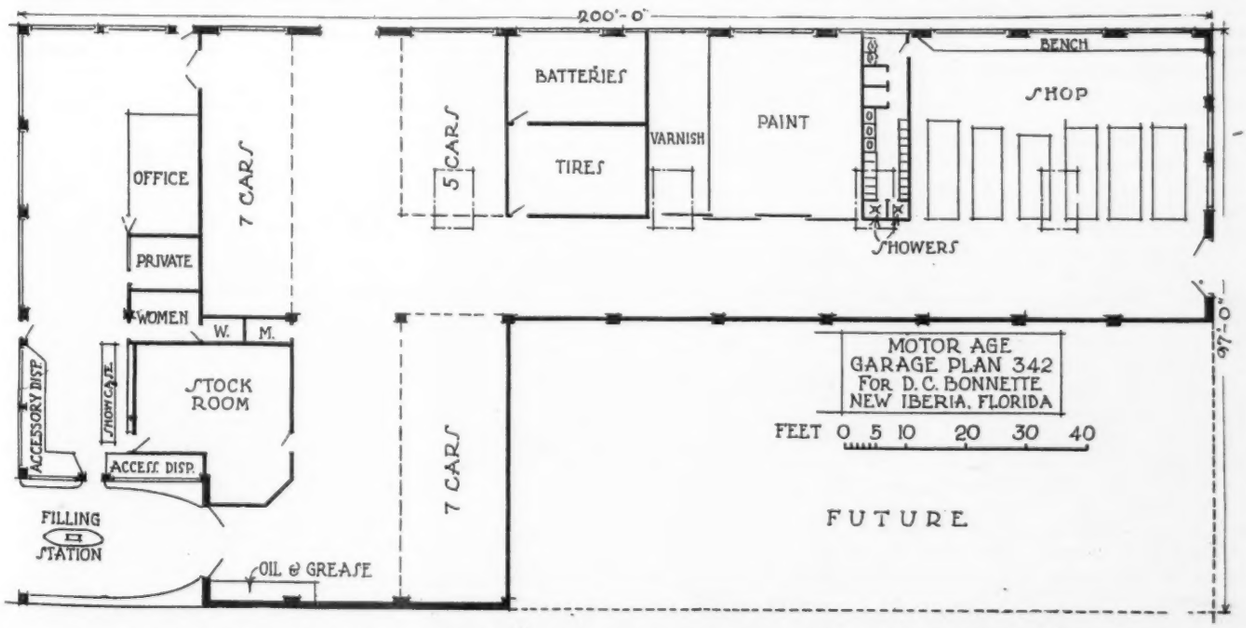
Building Restrictions

In remodeling a house into a garage, we plan to put in a cement floor but leave the outside walls just as they are. Is there, in the state of Wisconsin, any law governing the building of garages? What are the insurance companies and fire underwriters' regulations in this state?—An Old Subscriber.

First—Insurance companies or fire underwriters cannot make laws to govern anyone, although they may lay down terms in their policies of insurance which become a matter of contract, agreement between the insurer and the insured. As to what they might require of you should you desire insurance, you should take up with the local insurance agent. In general, the more fireproof the building and the more precaution taken to prevent fires and explosion, the cheaper the rate of insurance.

Your local authorities should be consulted as to the requirements of your town or city in locating your garage. There is no general law governing except the duty imposed on one to use reasonable and ordinary care in building a garage that is not to be a menace or nuisance to the safety and well being of the community. That is, the duty of the garagekeeper becomes important, should a fire or explosion occur to the injury of others.

Then the injured party would naturally seek to show that he (the garagekeeper) was negligent in the construction and operation of his garage—that he had not used the care of an ordinary prudent person to see that the construction and operation of the garage would not result in such explosion or fire. The state fire marshal might suggest things to lessen the hazard of fire.



Plan 342—Layout suitable for a modern garage and accessory store with a drive-in filling station

The Readers' Clearing House
Questions & Answers

Adjusting Rear Axle Gears

Publish diagram or phantom view showing adjustment of axle or differential to secure backlash.—Claude DeJean, Duson, La.

We regret we have no definite instructions covering the adjustment of the Columbia axle used in your car. We are publishing the phantom view requested. See Fig. 4. As all latter day axles are very much alike in general construction we believe the instructions on the adjusting of the axle used in the model 54 Hudson, which we are reprinting here, will serve your purpose admirably as it applies very well to all axles having adjustable ring gears and bevel pinions.

When rear axle gears get noisy or sing, especially when the car is inclined on the side of the road, it is a sure sign, nine cases out of ten, that the gears are out of adjustment. There are several conditions that make possible the howls and groans that arise from the rear unit, among them the location of the ring gear with respect to pinion, too much play in the gears, or a worn bearing.

Improper meshing, however, is the most usual cause. When gears are meshed properly there must be a certain amount of back lash. That is, there must be a minute distance between the teeth to make up for imperfections in the cutting of gears. Backlash will be made clear by referring to the illustration.

The view Fig. 1 shows the teeth properly meshed. Proper backlash should not be over 0.005 to 0.006-in. In the rear axle gears the heel of both ring gear and bevel pinion must be in a straight line, or flush, or there will be noise if gear or pinion is meshed too deeply.

Two Bearings

In nearly every axle construction there are two bearings for the bevel pinion shaft. One of the bearings is just back of the pinion and the other still farther back, these positions being applied when the axle is in its normal place and you are facing it, looking toward the front of the car. The ring gear, within which are the differential gears, also is carried on two bearings, one on each side.

In most gears it is possible to move the pinion back and forward a slight amount by adjustments provided for the two bearings, and there is always some arrangement made to move the ring gear either to the right or left along the rear axle line. Also play in any one of the four bearings mentioned can be taken up individually without disturbing the positions of the gears with respect to one another.

With a general understanding of axle gear adjustment a better idea is obtained

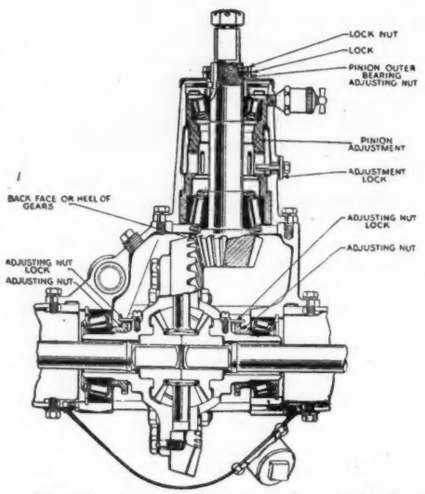


Fig. 1—Sectional view of a typical axle showing points of adjustment

as to how to proceed with the job. It is not likely that in new gears rear axle adjustments will have to be made for some time. This is work of a delicate nature and should not be undertaken by anyone unless familiar with mechanical matters.

Taking a typical example, let us assume we have a model 54 Hudson six on which the rear axle gears need adjustment. This is a 1915 car and was chosen because it is in older models that most adjusting is necessary. A sectional view of this model is shown. The points of adjustment also are indicated. Before attempting the adjustment remove the inspection plate of the differential housing.

In this axle, as in most designs, are locks that hold the adjusting nuts in position after they once have been set correctly. Naturally these must be disengaged before the adjustment can be made. After the inspection plate has been removed, examine the gears. See that back face or heel of teeth on both pinion and ring gear are flush, as shown.

End play in pinion shaft bearings is removed by nuts with locker washer at forward end of pinion shaft. The end play must be eliminated before the pinion is adjusted. Loosen the lock nut by turning to left when facing axle from front end. When this is released the inner nut either can be loosened, if there is lack of end play, or tightened, if end play is apparent.

Care should always be exercised not to take up too tightly on the bearing adjustment. Just enough to eliminate end play but not so as to cramp or bind. The shaft must turn freely. When this result is obtained, tighten all the nuts, turning to the right. The pinion adjustment can be reached by removing the adjustment lock on the right side of the differential carrier after the two cap screws, holding the lock, have been removed.

The pinion bearing mounting is slotted, and by the use of the tool which fits these slots it can be removed either in or out. If the pinion is to be meshed deeper in the ring gear, turn the adjustment up or downward to withdraw.

If the pinion is not flush with the ring gear or there is too much or too little lash between the teeth, the ring gear may be adjusted either in or out, to remedy this condition. The adjustment of the ring gear should be made as follows:

Remove the differential cover plate on the rear axle housing. Take off the adjusting nut locks located at either side of the differential and held in place by fillister-head. To move the gear toward the right back off the right adjusting nut 1 or 2 in. at a time and take up on the left nut the same manner. Or if the gear should go to the left, reverse the action. Take the side play out of the differential bearings with these adjusting nuts.

NON-STALL DIFFERENTIALS

Q—Why haven't the gearless differentials been more generally adopted? Are they not better than the ordinary kind, as they have the feature of locking together the rear whels in a tight place so that it is easy to get out—a thing other differentials do not permit because of the free wheel spinning?

2—Publish diagram of the Bailey differtial.

3—Are there any cars which are equipped with this kind of differentials on the stock models and if not, have the Bailey people and others withdrawn their products.

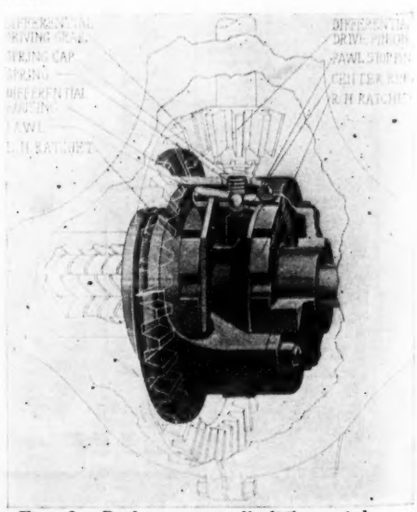


Fig. 2—Bailey non-stall differential

To attempt to explain why the device in question failed to become popular would, we fear, lead us into a lengthy dissertation of the economic aspects of manufacturing. This is true of other devices of the same nature as well as hundreds of apparatus which have been brought out in the past, enjoyed a short popularity and, eventually, been discarded.

2—See Fig. 2.

3—We know of no cars equipped with other than the standard type of differential. Information regarding the manufacturers is difficult to obtain, all indications pointing toward the discontinuance of business.

GEARS SHIFT HARD

Q—We have a 1920 Oakland roadster on which it is very hard to shift gears. Have gone over the clutch and it throws clear and stops as soon as disengaged. When trying to shift from low to intermediate or intermediate to high it is almost impossible to get the gears to let loose. Car wants to slow right down as scon as clutch is disengaged. No trouble for gears to mesh after car has come to dead standstill. You can put it in low and start; then, when you do disengage the clutch to go to intermediate, it seems that the gears bind. After you get it out of low gear it won't mesh in intermediate without the clashing. Can you advise trouble and remedy for same?—Ray M. Carpenter, New Lisbon, Ind.

Possibly your are pressing the clutch pedal too far down and applying the clutch brake so hard that the clutch is stopped instantly. When this is done you have the condition of one set of gears —those on the countershaft—at a standstill while those on the main shaft are revolving. This will always cause clashing. The binding is also attributable to the same cause. Try pushing down the pedal only enough to release the clutch and not enough to bring it to a stop. The foregoing is written with the assumption that the clutch is properly lubricated and is not dragging.

DORT AND MAXWELL QUERIES

Q—What is the purpose of the two small holes on the underside of the Dort axle, Model 17-A, on either side by the spring hangers? Have been told it was to let surplus grease out but it appears to let too much out for you cannot keep grease up to the filler plug.

2—Give the adjustment of the rear axle of the Model 17-A Dort showing which way to turn adjustment and if right or left-hand threads. This axle hums some when the foot is removed from throttle going down hill.

3—Maxwell 25 slips out of second gear when pulling. New main shaft and countershaft gears have been installed but have made no difference. Give remedy.

4—Where can parts for a Simms magneto, used on a Maxwell 25, be obtained?

5—Show power curve of the new Overland Light 4.

6—Show power curve of the Chevrolet 490.—Cornelius S. Ackerly, Delhi, N. Y.

1—You have been correctly informed. If too much grease is leaking out it is because the felt packing washers on each side of the differential are worn. Replace with new.

2—See Fig. 3 showing the internal arrangement of this part. All adjustments have right hand threads and are turned to the right to tighten and left to loosen. The fact the axle hums or growls under the circumstances mentioned does not necessarily indicate that it is in need of adjustment. The sound is caused by the large bevel ring gear driving the small pinion. Such a reversal of the purposes of the gears will nearly always cause some noise. Try releasing the clutch, or even shifting the gears to neutral while coasting down hill and see if this will not eliminate the objectionable hum.

3—Possibly the second gear speed gear shifter fork is sprung a trifle or the locking mechanism worn. The remedy for the first is obvious. To remedy the second file out the notches of the interlock making them deeper and sharper.

4—From the Maxwell Motor Co., Detroit, Mich., or the Simms Magneto Co., East Orange, N. J.

5 and 6—Neither of these power curves are available.

ONE HEADLIGHT DIM

1—What can be done to a Buick Headlight, model K45, of which the right light is dim and the left light is bright. We have exchanged bulbs but it does not seem to help any. The dimmers are O. K. and also the sockets.

2—Give instructions on how to run a 6 or 12 volt motor driven horn from a Ford magneto. Are there any extra parts to use and where can they be obtained? —F. C. Hoefling, Palmer, Iowa.

1—We think it likely that there is a high resistance joint somewhere in the lines leading to this headlight. Such a high resistance would be caused by a loose or dirty connection. Also it is possible that the spring in the lamp socket has lost its tension.

2—A motor driven horn cannot be operated on the current from a Ford magneto. This for the reason that the Ford magneto current is of the alternating variety and is very high in frequency.

The Readers' Clearing House

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by someone else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

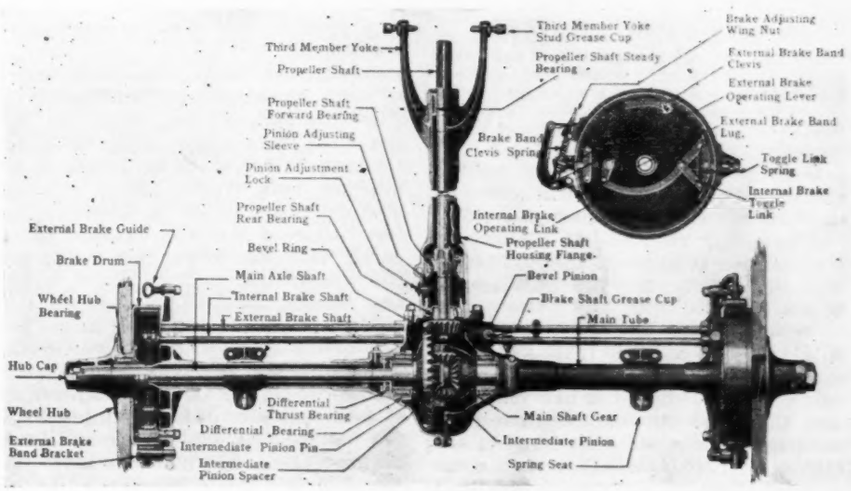


Fig. 3—Cut away section of Dort axle

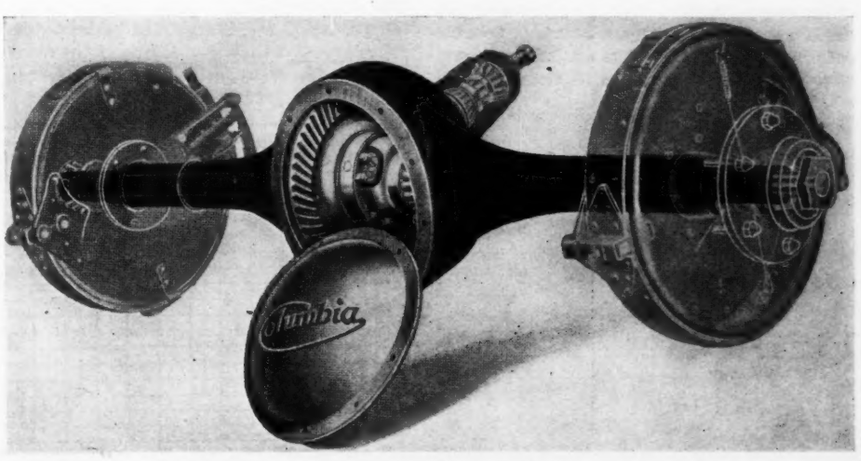


Fig. 4—Phantom view of Columbia axle

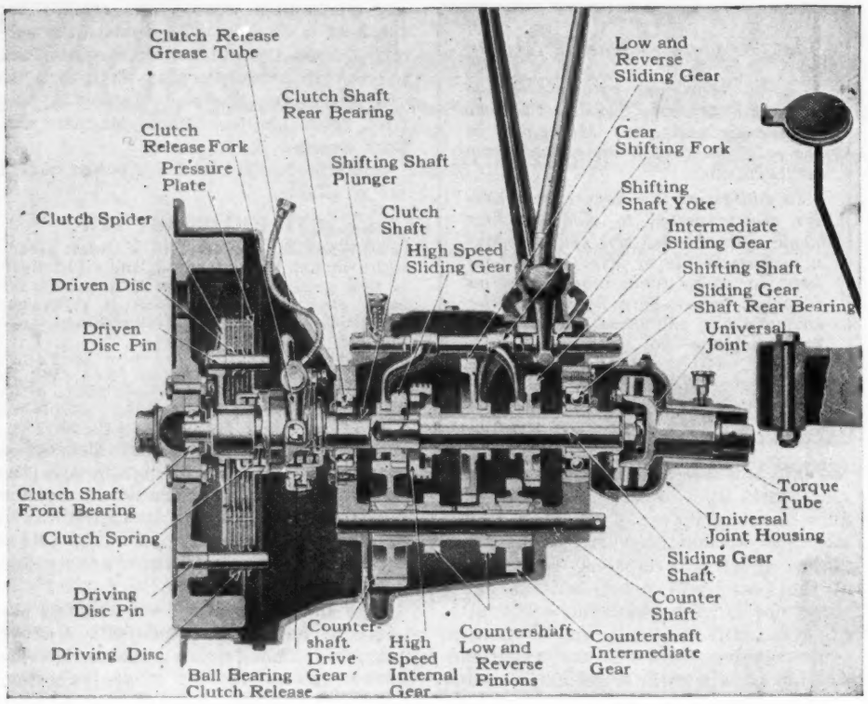


Fig. 5—Sectional view of Dodge clutch and transmission assembly

DODGE CLUTCH ADJUSTMENT

1—Can the disk clutch of the 1918 Dodge Brothers car be adjusted without removing the motor or rear end?

2—Please publish the power curves of the Nash 681, Dodge Brothers and Overland 90.

1—Ample provision is made for the adjustment of this clutch. The following instructions cover the operation fully:

A sectional view of the clutch and transmission assembly of the 1917 Dodge is shown in Fig. 5. The transmission is not provided with any adjustments. If noise develops and the transmission fails to function properly it will be a case of worn or broken parts and the only remedy is to install new ones. In case the gears slip out of mesh it is possible to make an adjustment of the shifting shaft plunger. There is a notch in the shaft which may become worn and the ability of this plunger to take hold is dependent upon the spring and notch. Therefore it is always advisable to examine the spring and notch if trouble of this kind is experienced. If a growling noise develops in the transmission it is probably due to worn bushings or worn gears.

To adjust or tighten the clutch spring it must be compressed sufficiently to allow the split washer, which fits into one of the three grooves cut on the clutch shaft, to be moved forward until it fits into the next groove. After this has been done care should be taken that the two halves of this split washer fit securely into the proper groove on the clutch shaft and that the clutch spring rear retainer fits snugly around the split washer. Keep the drain hole in the bottom of the clutch housing open so any oil can be drained out readily. The grease cup on the toe board to the right of the accelerator pedal which lubricates the ball bearing clutch release should be kept filled and should be given one complete turn about every 100 miles.

Make sure the clutch release tubes are tightly connected and unobstructed. If the clutch facings have become glazed or greasy, the disks should be held apart and a solution made up of a tablespoon of powdered rosin dissolved in a pint of turpentine squirted on them. Work the clutch pedal back and forth until the turpentine has had a chance to cut into the facings and dry. When the heads of the rivets which hold the fabric to the disks are found to interfere with the driven disks they should be hammered down. The disks should slide easily on the pins. See that the pins in the flywheel and clutch housing are parallel, or if necessary enlarge the holes in the disk slightly. Care should be taken not to enlarge these holes too much as this will cause the clutch to rattle.

In removing the clutch and transmission assembly the first operation necessary is to disconnect the front universal joint, which will allow the driveshaft to drop down. Remove the bolts from the rear engine supports and place a jack under the engine to hold it in place. Remove the battery and battery box. Loosen the exhaust pipe enough to permit sliding it over to one side. Remove all of the bolts between the engine and clutch housing. The clutch release bearing has two small arms supporting it which must be released before the units can be taken out. After these operations have been completed the entire assembly can be slid back and dropped.

2—See Figs. 6, 7 and 9. The curve of the 1920 Overland 4 is not available.

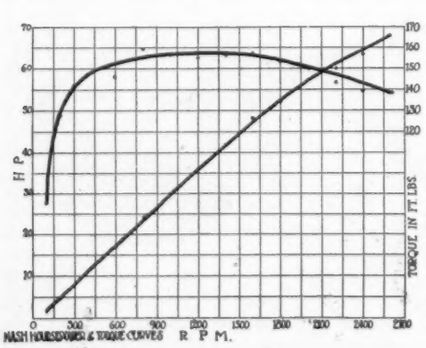


Fig. 6—Nash horsepower and torque curves

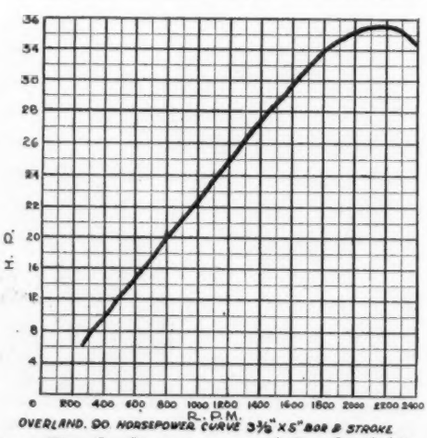


Fig. 7—Power curve of Overland 90

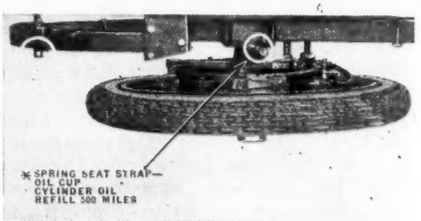


Fig. 8—Lubricating Dodge spring seat

LUBRICATING SPRING SEAT

Q.—Publish diagram explaining method of lubricating spring seat on Dodge Brothers car.—Wm. Baumrucker, Chicago, Illinois.

The diagram shown in Fig. 8 is self explanatory.

OIL GAGE FOR DORT

Q—Can an oil gage or sight feed be installed on a model 15, 1920 Dort car? Please show drawings.—Russell J. Miller, Kokomo, Ind.

It is a simple matter to install such a gage. At the right and rear of the motor you will find a ⅛-in. pipe closed by a cap. Remove the cap and, after fitting the end of the pipe with a ball check, carry the line on up to the instrument board, installing the gage anywhere desired. A diagram showing the pipe or method of installation is not available.

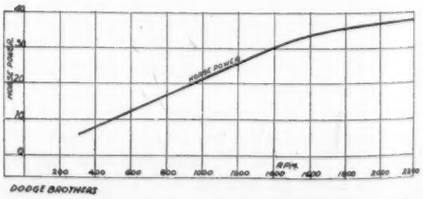


Fig. 9—Dodge Brothers power curve

ENGINES—POWER CURVES

ADJUSTING BEARINGS

Q—How can you determine when you have taken up enough play on a main and connecting rod bearing?

2—In riding over a rough or smooth road, when the clutch is disengaged, it is impossible to get the car to take gas by stepping on the accelerator or by opening the throttle until the clutch is engaged. This does not occur every time. What do you think is the trouble?

3—How can you test out a cut out with a buzzer or test light?

4—Why do the contact points and spark plug burn up on a 1919 Saxon car.—L. M. Louis, Savannah, Ga.

1—Expert service men cultivate a sense of touch so delicate that they can determine within .002 inch whether a bearing is tight enough. This comes only with lcng experience and cannot be acquired except through much patience. We would advise that you have the work done by a competent mechanic.

2—Either the carbureter on your car is set to give a very lean mixture or the throttle stop is backed out too far. Either of these conditions will cause the engine to stop when the throttle is closed suddenly. This is aggravating if the going is rough as the gasoline in the carbureter is violently agitated and does not maintain a constant level. The reason the engine picks up after you engage the clutch is that the momentum of the car is sufficient to start it turning. It then takes in gas and goes on running.

3—We should have to know the make of the cutout to reply to this intelligently. To make the instruction clear a diagram of the unit will be needed.

4—By contact points we suppose that you mean those in the distributer. The usual cause of rapid burning of these is a faulty condenser in the ignition coil. Poor quality points will burn more rapidly than those of better quality. It is possible that spark plugs with small points are being used. If so it is not at all surprising that they burn rapidly. Try plugs with heavier electrodes.

MYSTERIOUS KNOCK

Q—What causes the engine in a 1917 Chandler to knock when idling? The bearings are tight and we have replaced all the timing chains.—W. J. Adams & Son., Oneida, Ill.

Despite the fact that you have replaced the timing chains we believe the trouble will be found to be in them. Or rather, we should say, between them and the gears. As a rule it does very little good to replace chains without, at the same time, replacing the gears. This for the reason that the old gears are usually so badly worn that the new chains do not fit them correctly.

NO TAKEUP ON TIMING CHAIN

Q—Is there any way to adjust the timing chains on a 1914 Cadillac touring car as they are getting too loose?—G. H. Haserodt, Edison, Ohio.

Fig. 12 shows a very good view of the chain arrangement. It is quite apparent that there is no way to take up the slack. New chains will be needed. It is also recommended that new sprockets be installed at the same time as it is quite likely that the old ones are so badly worn that the new chain will not fit well.

TIMING AMERICAN SCOUT

Q—Would like to retime the valves in an American Scout 1914 (Atlas engine T Head 4 in. by 5 in.) so that there will be no overlapping. Say, have the intake open about 10 deg. after upper dead center and the exhaust close after top dead center about 5 deg. giving that vacuum which helps the intake of gas. My car has the intake open on upper dead center and exhaust close on top dead center. Could the change be made by advancing or setting back the timing gears a few teeth? If that could be done wouldn't the magneto timing have to be changed accordingly?

If the above change could be made would the "average timing of engines when the marks are not known" suit? Another thing: all the timing marks have been turned off the flywheel to make a place for a starting ring gear which I had put on. How would I go about figuring the different degrees of revolution on the flywheel if I could make the change? I notice that the Ford car has the intake open after upper dead center 12-40 deg. while the exhaust closes right on top dead center. Doesn't that explain some of its marvelous power?—C. W. Jackson, San Francisco, Calif.

It is unfortunate that you did not make a record of the flywheel markings before cutting them off. This is not said in a spirit of criticism but in the hope that it may prove of assistance to some one else who may have the same problem in the future. The damage has been done and now remains the question of getting out of the unfortunate predicament.

We believe you will do well to use the exhaust opening and the inlet closing as starting points. For the former we suggest a setting of 50 to 55 deg. early. For the latter 45 to 50 deg. late. The engine will run with this setting although it may not be the best from an efficiency point of view. With this as a starting point the original timing can be worked out by changing the timing gear settings by not to exceed two teeth (probably not more than one tooth) either forward or back.

The magneto timing is of secondary importance. With the advance control fully retarded breaker points should separate at the instant the pistons reach the top dead center. However, some latitude can be allowed here, a difference, if there should be one, being one the side of a slightly advanced rather than a retarded setting. To divide the flywheel into degrees measure the diameter and multiply by the constant 3.1416. This will give the circumference. Divide this figure by 360. This gives degrees.

The factor of valve timing is only one of several that are responsible for the power of the Ford engine. The American Motor Parts Co., Indianapolis, Ind., advertise parts for these cars.

KNIGHT ENGINE INQUIRIES

Q—Publish power curves of the 1920 four -and six-cylinder R & V Knight.

2—What is the maximum hp. of the 1920, model 20 Willys-Knight? What is the r. p. m. of this engine?

3—The crankshaft on an old Willys-Knight engine having a 4⅛ in. bore and 4½ in. stroke has been broken. I have a crankshaft that would fit in there and have enough place but it has a 5 in. stroke. Would install shorter pistons to reduce the compression. Could I use the same camshaft with this 5 in. crankshaft? Are there any other changes that would have to be made?

4—Would the engine have more power? —Alois A. Pimper, West Point, Nebr.

1. See Figs. 10 and 11.

2. The manufacturer's rating is 40 h. p. That given by the S. A. E. places it at 21.63 h. p. The power curve shows a maximum effective speed of 2,500 r. p. m.

4. Like many undertakings of the kind, entirely within the bounds of possibility, the practicability of it is to be questioned. Shorter pistons would be out of the question as they would not have sufficient bearing surface. Another eccentric shaft would also be needed. While it is possible that such changes would result in an increase in power, it would be at an expense out of all proportion to the benefits gained. On the whole it would be greatly preferable to purchase a new shaft of the correct design.

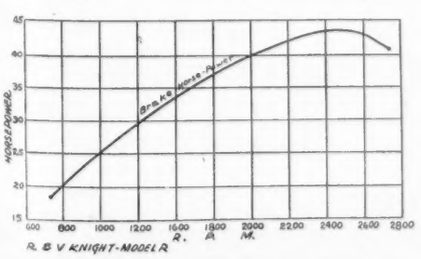


Fig. 10—R & V Knight model R power curve

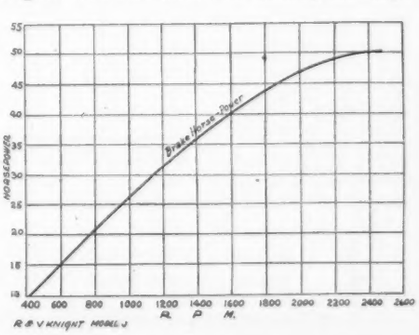


Fig. 11—R & V Knight model J power curve

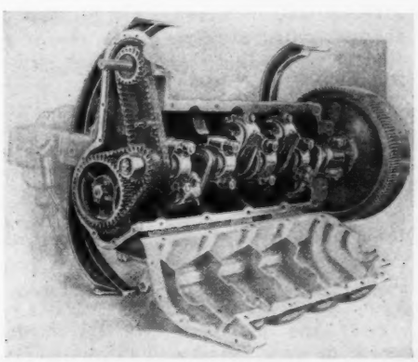


Fig. 12—Timing chain on 1914 Cadillac

ELECTRICAL SYSTEMS

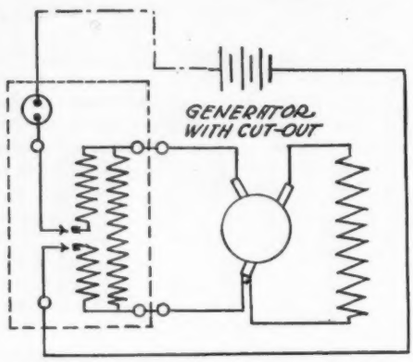


Fig. 13—Leece-Neville cutout used on 1916 Haynes

CUTOUT POINTS BURN

A Haynes, 34 Type T, causes considerable trouble with the controller and relay, at the dash, burning out contact points. Installed two new ones, but after a year's running they burn out. The burning progresses slowly until the points are gone. Could you suggest a remedy? How would it be to install an ordinary 6-volt relay? Please give diagram.—H. D. Pierce, Delmont, South Dakota.

In the first place this seems to us to be a fair service record for these cutout points and especially so if the car is driven considerable and many stops made. It may be that the reverse current at the time of the separation of the points is too high. This would cause excessive arcing of the points and, as these are carbon blocks, would result in the burning complained of. The value of the reverse current can be checked by connecting an ammeter in circuit leading to the battery. Should the current show a reverse reading of more than 2 amps., it will be well to increase the tension of the relay armature spring. Sometimes the arcing can be cut down appreciably by connecting a condenser across the points. It will do no harm to try this and it may have the desired effect. The only objection that can be raised to the substitution of one of the later types of relays is that the metal points might not be of sufficient area to carry the charging current without heating. If you can procure one with exceptionally large points we believe it will give satisfactory service. A diagram of the generator and cutout is shown in Fig. 13. Note that there are four cutout contacts.

SUSPECTS LUBRICATION SYSTEM

Q—Is there any way to stop piston slap without reboring the block and installing oversize pistons?

2—Am having trouble with the oiling system on a Chevrolet 490. Will it harm the engine if the dash gauge does not work?

3—Publish internal wiring of coil on Chevrolet.—C. B. Norris, Willow Shade, Ky.

1—If the cylinders are not badly scored or worn out of round oversize pistons can be lapped in by hand. Any service shop should be able to do a satisfactory job. New rings will, of course, be needed.

2—It is quite possible that the pump is worn somewhat. Should such be the case the installation of a new pump or, at least, new gears may remedy the trouble. The much discussed "crankcase dilution" is responsible for much of the seeming failure of the lubrication pump. By this term is meant the thinning of the cylinder oil by the heavy parts of the gasoline which do not burn but mix with the oil on the cylinder walls and pass down into the crankcase.

The clue to this condition is that the pump will register when the engine is first started but fail to do so after the oil has become heated and thinned. The remedy is draining out the old oil and replacing it with fresh. Some motorists do this every 500 miles. It is possible that your pump is circulating the oil in sufficient quantity even though without sufficient force to register on the gage. However, we do not recommend placing too much confidence in this but urge strongly that the pump connection be disconnected and the oil flow checked. The diagram shown in Fig. 15 will assist in this.

See Fig. 14.

GENERATOR QUESTIONS

Q—Can you tell me why a Wagner automobile generator fails to generate? Have had two of them for repair and can get only about 3 amperes out of them. Put new brushes on one and sanded all of them well. The circuits test out O K and so do the armatures. One generator was from a 1915 Studebaker and the other from a Saxon. Both have third brush regulation. They give about 8 volts at the terminal but hardly any current. If an ammeter is shorted across the terminals the pointer flops over then goes back to 0.

2—What method is best for testing leaky battery jars? We use 110 volts and a lead tank, having a lamp and the tank in series and a test point to insert into the jar. Have also tried a spark coil but have trouble due to dampness across the top of jar.

3—Is there any regulation on the Dyneto generator of a 1917-18-19 Elcar automobile? Cannot find any. The third brush seems to be fixed.

4—What causes the voltage of a battery to go way above normal (2.8 deg.) on charge and then on discharge it drops very low, like a condenser? The plates are not sulphated and seem to be in good shape. We repaired one before which had very tough wood separators. We reinsulated the battery and the trouble was gone. Was this caused by the acid not having been able to work freely through the separators?—Arthur Johnson, Elbow Lake, Minn.

1. Accepting your statement that the armatures are all right, we should say that you are making the wrong kind of a test. This is a shunt wound machine and when you connect to the terminals with a low resistance of any sort you short circuit the machine. The immediate result is a heavy surge of current which, as you say, makes the pointer swing clear across the scale. The almost instantaneous reaction of the armature distorts the field magnetism which, in turn, has the effect of reducing the generator output to zero.

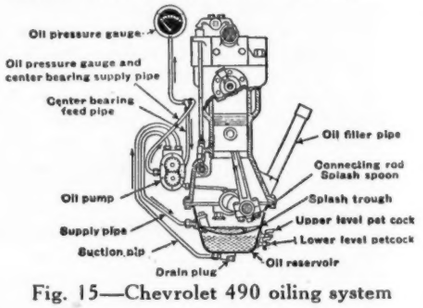


Fig. 15—Chevrolet 490 oiling system

It is for this reason that instructions are given to short circuit generators when they are to be run without being connected to the battery. The fact that

Internal Connections of Connecticut Coil

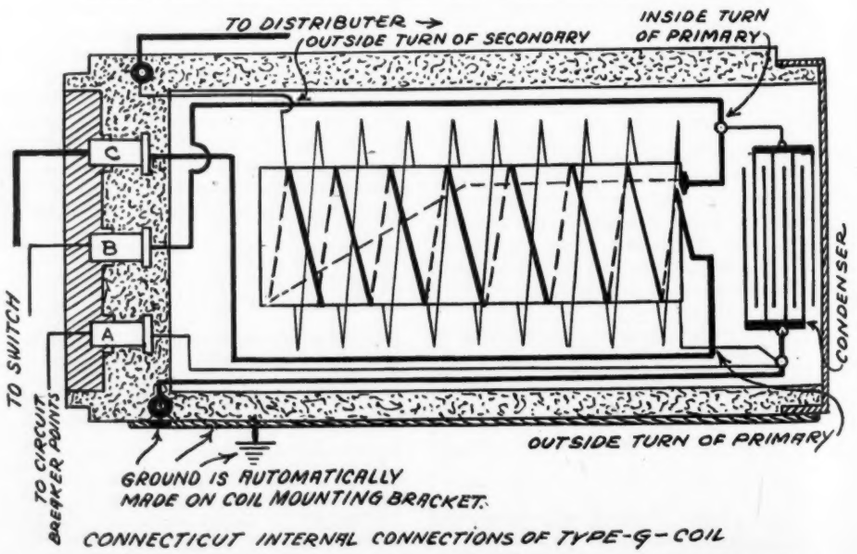


Fig. 14—Internal circuits of three-terminal coil such as used on Chevrolet

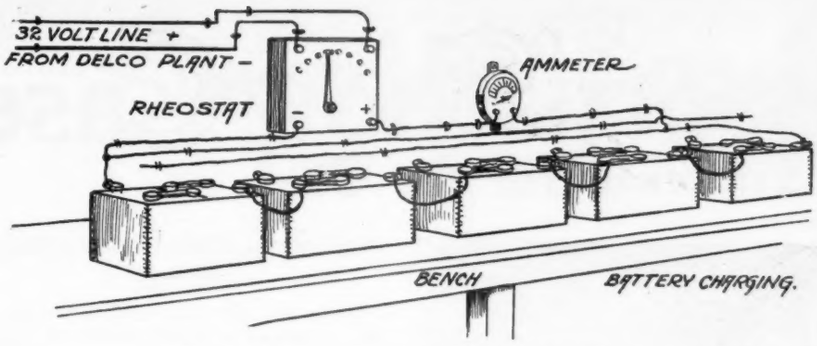


Fig. 16—Arrangement of charging bench

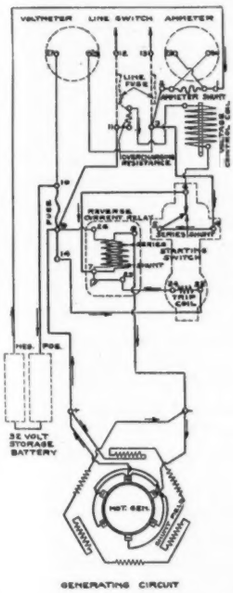


Fig. 17—Internal wiring of Delco light plant

you get 8 volts convinces us that the generators are delivering their capacity. In testing hereafter connect the generator with a battery so that it will have some work to do. Then make your amperage tests by inserting your ammeter in series with the generator and battery and not connecting it directly across the terminals. Only the voltmeter is used in this latter way.

2. The simplest and most efficient is the hot water test. The only objection to it is that considerable time is required. Fill the jars with very hot water and let stand for an hour or longer.

The test you are using is very good but a 110-volt lamp is hardly sensitive enough to detect the small amount of current that would leak through a minute crack. A sensitive galvano-meter or low reading voltmeter would, doubtless, serve better. Adding a small amount of acid to the water will also increase the sensitivity of the apparatus.

3. About an inch below the top of the generator will be found a fiber plug. Upon removing it with a sharp instrument the head of the third brush lock screw will be disclosed. With it loosened the third brush can be moved.

4. High internal resistance. What would happen if the separators were made of glass? In such a case a reading taken at the posts, with the battery on charge, would be a reading of the line voltage and not that of the battery. Carrying this thought out, as the internal resistance is reduced more current will pass through the battery and less through the meter with a subsequent drop in the reading. If, as you say, the plates are not sulphated, the trouble must be in the separators.

These may have been all right originally but have become clogged with sulphate. We would recommend checking this by means of the cadmium and the high discharge test. If, after a prolonged charge, the plate groups fail to show a proper voltage when tested with the cadmium meter and the battery fails to show a discharge of from 300 to 1,000 amp. on a short circuit discharge, you will be justified in replacing the separators.

EISEMANN MAGNETO

Please publish the wiring diagram of the Eisemann magnetos No. 104515 and model EMI. R4. This is for the dual ignition system, but I want it for the inside of the magneto alone.—Henry Rodemer, Greenview, Ill.

See Fig. 18. This diagram will apply to nearly all makes and types of high tension magnetos as they are very much alike. Should you wish to use the machine as a straight high tension outfit connect a jumper of high tension wire, such as is used for spark plug leads, from the collecting brush to the center binding post of the distributer block. This will cut the dual coil out.

CHARGING BATTERY WITH DELCO LIGHT PLANT

Q—Publish wiring diagram and equipments needed to charge 6 and 12 volt batteries from a Delco lighting system of 32 volts with a charging rate of 20 amp.

2—What would be the cost of material to rig this plant up to do this work?—L. Cooper, Lutesville, Mo.

Fig. 17 shows the wiring scheme of the 32 volt Delco light plant. Fig. 16 is the suggested method of arranging the charging bench rheostat and wiring to charge automobile batteries from the light service line. It is recommended that 16 cells of battery be carried in series on the line at all times if practicable. This for the reason that this load will balance the voltage and it will not be necessary to dissipate energy in the rheostat.

This unit is recommended as it will make it possible to carry a varying number of batteries on the line if necessary. The suggested scheme contemplates a 24 hour per day service as, during the night, the large plant battery will discharge through those on charge.

The cost of installation will vary with the locality as a large part of the charge will be for the bench and the wiring. A suitable rheostat can be secured from the Allen-Bradley Co., Milwaukee, Wis., or Schaffer Bros., Chicago, at an approximate cost of from $35 to $50. Any of the better quality instrument panel type automobile ammeters will be satisfactory for use in the charging circuit.

GEARING UP AUTOMOBILE

Q—What gear ratio must a 1920 Oldsmobile four-cylinder, Model 43-A have to obtain a speed of 65 to 70 m. p. h?

2—Where can gears of special ratios to make the change be obtained?

3—About how much would this effect the pulling power on hills?—J. E. Clarke, Springfield, Ill.

1—About 3¾ to 1.

2—The gears would have to be cut to order.

3—The hill climbing ability would naturally, be decreased. We would advise against the change.

RACING CAR BRAKES

1—Are modern racing cars, such as used in the Indianapolis race equipped with brakes of any kind?

2—What type?

3—How many of the cars were equipped with brakes?

1—All cars entered in events under the auspices of the A. A. A. are required to be equipped with brakes. Not only this but the brakes must be in efficient working condition as a short stop test is part of the preliminary qualification ceremony.

2—Various kinds of brakes. This is left to the discretion of the designers and builders. Consequently all types are seen from the conventional internal expanding and external contracting to the new four-wheel hydraulic.

3—See above. Another of the rules is that the eguipment must include at least two, independent brakes.

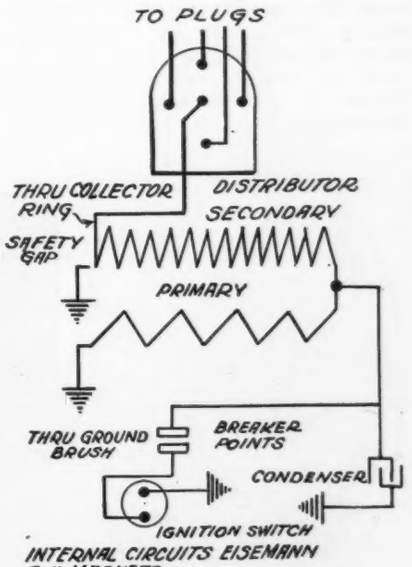


Fig. 18—Schematic diagram of Eisemann magneto

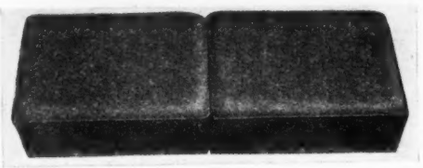
The Accessory Show Case

New Fitments for the Car

Replacement Seats

Replacement cushions for Ford cars are being offered by the Fort Pitt Bedding Company, Pittsburgh, Pa. These seats are being manufactured for both the front and rear seat of the open and closed model car. The front cushion for the touring car is made in two halves so that the gasoline tank may be filled without the necessity of the driver leaving the car.

Finished with the same variety, grade and shade of material as the original upholstery, the replacement cushions for the coupe and sedan models are said to harmonize with the rest of the car's interior. They are of substantial steel frame construction and are equipped with heavy gage flexible spiral springs tied together with substantial steel hinges and stuffed with a high quality of upholstery. The All-Wanta, as the product has been named by the manufacturer, is said to be as comfortable as largest seats. The price is $10.50, for either the front or rear cushion.



The "All-Wanta" replacement seat

Gier Tuarc Disk Wheel

A departure from the conventional in the design of disk wheels is found in the Gier Tuarc Steel Disk Wheel, the latest product of the Motor Wheel Corporation, Detroit. The salient feature of the new product is the simplicity with which it may be applied to cars now equipped with wooden wheels, the design being such that the disk wheel readily fits the hub of present type wooden wheels without changes in either of the elements. Of the concave-convex form, the wheels are said to be exceptionally light and rigid, but, despite the latter fact, resilient. Evidence of carefully thought out design is the fact that the valve hole makes the valves as readily accessible as the conventional type of wheel.

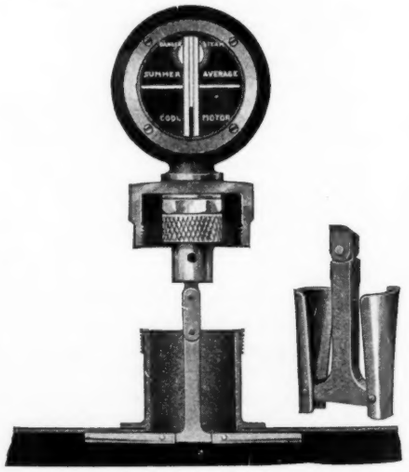
Dirigible Spot-Light

The Anchor-Lox Co., 611 North Capitol Ave., Fort Wayne, Ind., announce two clever accessories which will doubtless enjoy a widespread demand. One of these is a dirigible headlight bracket which may be turned from side to side or tilted upward and downward through wide angles. This device is controlled through the medium of a flexible shaft ending in a small hand wheel. Turning the wheel to left or right causes the bracket to turn in these directions, while pushing the wheel in or pulling it out causes the up and down tilting movement. With the spotlight attached to this device it may be directed wherever desired, the driver having to remove his hands but a few inches on the steering wheel.

The other device is a motormeter lock which is marketed under the trade name of Anchor-Lox. As its name implies, the locking element of this little contrivance is made in the form of a four part expanding anchor which, when once installed in the radiator extends across the bottom thereof and can never thereafter be removed. The anchor and the hardened steel anchoring chain are both thoroughly rust-proofed. Retailing at $1.75, Anchor-Lox is said to be the best motormeter insurance to be had.

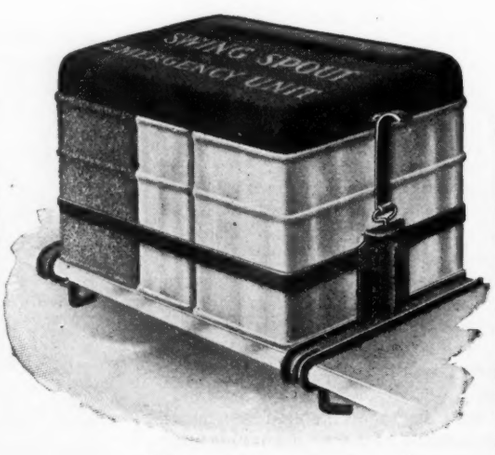
Swingspout Emergency Unit

With his car equipped with the Swingspout Emergency Unit, manufactured by the Swingspout Measure Company, 404 North Los Angeles St., Los Angeles, Cal., and marketed by Hughson & Merton, Inc., the motor tourist need never worry about running short of gasoline, oil or water many miles from where either of these may be procured. These units, or more practically speaking, these three-in-one units consist of three containers which are held in position on the running board by means of a clamped-on bracket. They are made of heavy sheet metal and each is equipped with a swinging spout which folds into a recess in the top when not in use. The water and gasoline containers have a capacity of two gallons each, while the oil container accommodates one gallon. There is nothing of the emergency make-shift contrivance appearance about the device, as a snug-fitting heavy gage sheet metal cover gives it a workmanlike finish and protects the containers and spouts from injury.

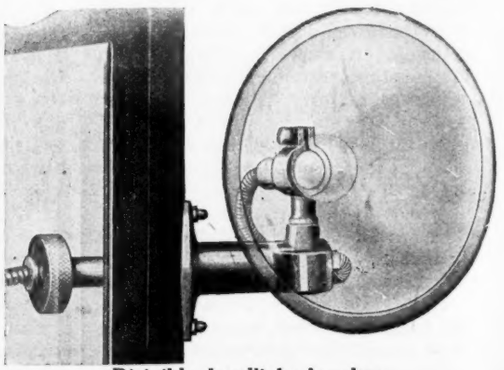


"Anchor-Lox" motor meter lock

Gier Tuarc disk wheel



Swingspout emergency unit



Dirigible headlight bracket

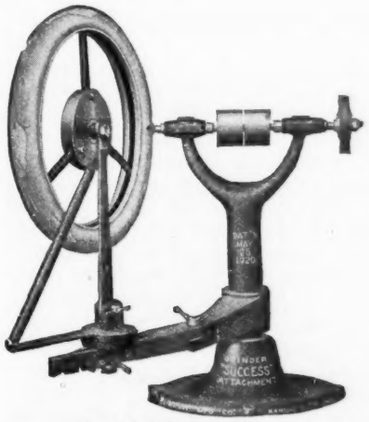
Service Equipment
Time Savers for the Shop

Keystone Cylinder Reamer

The Keystone Cylinder Reamer, so-called to distinguish it from the numerous reboring tools which are on the market, is offered by the Keystone Reamer & Tool Company, Millersburg, Pa. It is claimed that cylinders of 4 model T Fordson Tractor and Dodge engine finished with the new tool require no lapping or burnishing, as no tool marks are left, the job being finished with a mirror polish. The apparatus may be used as a hand or a machine tool drill press connection being provided. It is exceptionally fast in operation, removing .031 in. of stock from a cylinder in from five to eight minutes. The cutter adjustment, made by means of hardened steel collars, range from 3¾ to 4⅛ in. It is not necessary to unbolt the apparatus from its original setting on the engine block to make any change in the adjustment. This latter feature is said to differentiate the apparatus from any other extant.

Tire Buffing Machine

The removal of the adherent particles of rubber from tire carcasses is speeded up by the use of the Success Buffing Machine, manufactured by the Durham Manufacturing Co., 1518 Grand Ave., Kansas City, Mo. This machine consists of two separate parts, a grinder head, mounting a wire brush and adjustable mandrel upon which the tire being buffed is held, and a strong arm which, projecting from the vertical column of the grinder, supports the mandrel. The projecting arm and the mandrel supporting column are so hinged that the tire tread has a free universal movement. This permits bringing all parts of the carcass in contact with the buffing brush. The grinder head can be equipped with conventional grinding and buffing wheels when this is desirable.



Tire buffing machine

Key ring spark plug tool

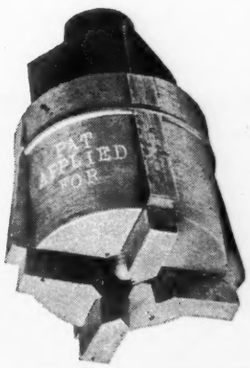
Key Ring Spark Plug Tool

The "Carbon Pick" brought out by the Globe Tool & Manufacturing Company, 2635 Stephenson Ave., Los Angeles, Calif., is a handy little tool with which to remove carbon from spark plugs. The long slender blade reaches down into the plug cavity between the insulator and shell and easily scrapes away the troublesome deposit. Although claimed to be much more efficient than a knife blade for the work "Carbon Pick" is so small that it may be carried in the vest pocket or attached to a key ring.

E. E. Tappet Wrench

A special set of tappet wrenches have been placed on the market by E. Eddleman & Company, 2638 N. Crawford Ave., Chicago. This set of wrenches is made of a good grade of tool steel and is case hardened. The wrenches are of a thin model which allows one to get at any set of tappets. The wrenches run in size from ⅜ in. to 11/16 in. Each wrench has a double end and the ends are so selected that the jaw sizes are duplicated throughout the set; this construction enables one to select the wrenches of the same sized jaw when working upon a set of tappets having a set of similar sized nuts.

Visible gasoline pump



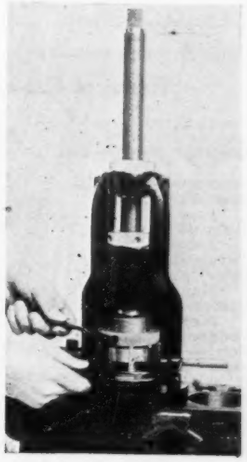
Adjustable valve cap wrench

Adjustable Valve Cap Wrench

What the manufacturers, The Carl Meyer Co., 1114-1116 Dorr St., Toledo, O., have named a Valve Port Cap Wrench will probably find a warm welcome and extensive use in the service shop. Made on the order of a lathe chuck, with expanding jaws, the device can be used to remove or replace valve caps of the conventional designs quickly and easily. For those caps which are designed to be moved by a spanner wrench the new tool has four downwardly projecting parts which can be expanded or contracted within wide limits. Caps made with square or hexagon cavities are also provided for in the new tool, which has four other parts projecting sidewise which can be moved in and out to accommodate any size cavity.

Visible Gasoline Pump

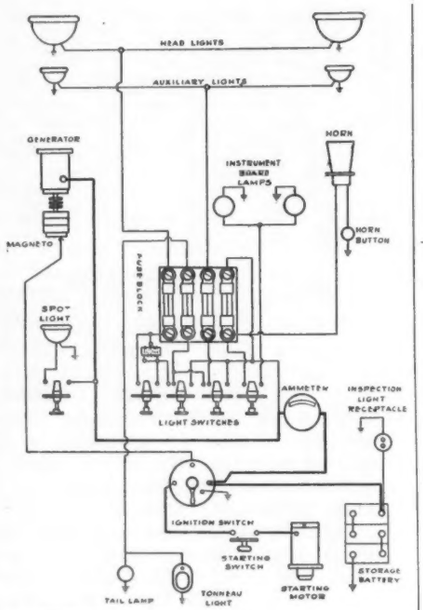
Believing that motorists want to and are entitled to see what they are getting when purchasing gasoline, the American Oil Pump & Tank Company, Cincinnati, O., are supplying the American Visible Curb Pump. The apparatus is of all metal construction with the exception of the measuring element surmounting the whole. This part, made of clear glass, is graduated in five equal divisions and protected by a lattice work steel protector. The pump is of the single action quick return type, pumping five gallons at a stroke and returning to the bottom position with 2½ turns of the handle. Finished in a bright red enamel and surmounted by an electric light fitting, the apparatus serves as an excellent advertisement which may be seen from a long distance.



Keystone cylinder reamer

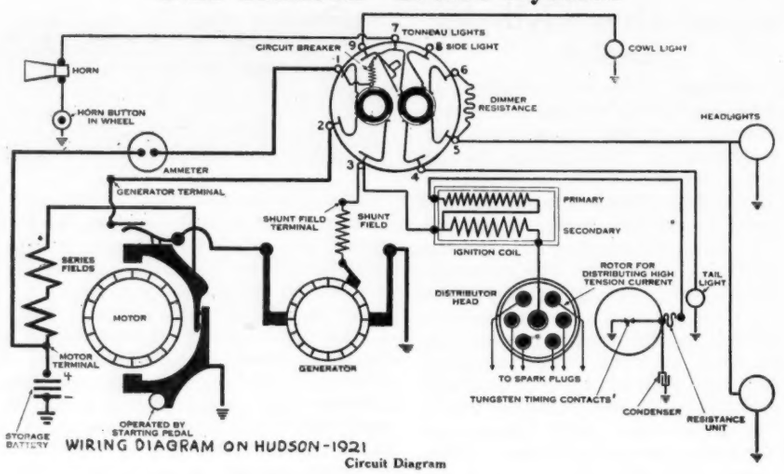
Motor Age Weekly Wiring Chart No. 132

1921 Dorris — Bosch Magneto and Starter



WIRING DIAGRAM ON DORRIS - 1921.

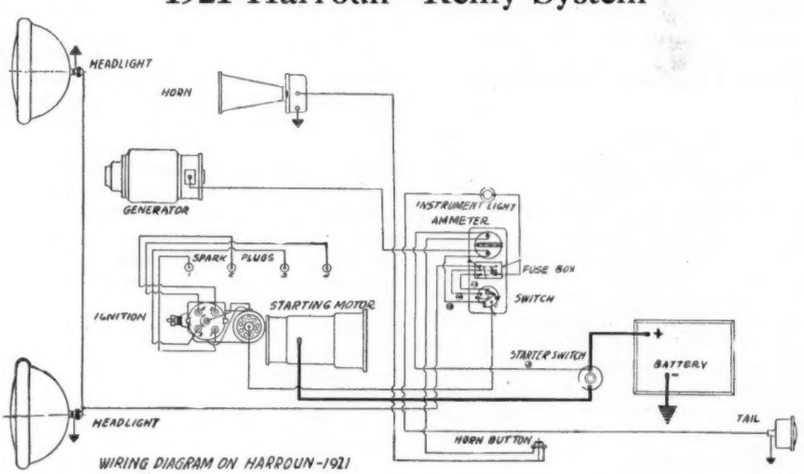
1921 Hudson—Delco System



WIRING DIAGRAM ON HUDSON-1921

Circuit Diagram

1921 Harroun—Remy System



WIRING DIAGRAM ON HARROUN-1921

Name of Car and Date on Which Wiring Diagrams Have Appeared in Previous Issues

American Beauty—Feb. 17, '21
Apperson—June 2, '21
Case—Feb. 17, '21
June 9, '21
Chalmers—Feb. 24, '21
June 9, '21
Cleveland—Feb. 24, '21
Cole—Jan. 20, '21
May 5, '21
Daniels—Feb. 17, '21
May 12, '21
Dodge—Sept. 23, '20
Dorris—Feb. 24, '21
Elgin—March 17, '21
Elkhart—March 3, '21
Gardner—April 14, '21
May 19, '21
Grant—March 31, '21
Haynes—June 9, '21
Hudson—Jan. 13, '21
March 17, '21
Hupmobile—Feb. 3, '21
April 14, '21
Jackson—March 17, '21
Jordan—March 10, '21
King—March 3, '21
Kissel—April 28, '21
Klinekar—April 14, '21
Lexington—May 26, '21
Liberty Six—June 2, '21
Locomobile—May 5, '21
McFarland—March 24, '21
Mercer—March 24, '21
May 12, '21
Mitchell—Jan. 6, '21
April 21, '21
Monitor—March 31, '21
Nash—May 26, '21
National—March 10, '21
May 12, '21
Oakland—March 24, '21
Oldsmobile—April 21, '21
April 28, '21
Packard—March 31, '21
Paige—March 10, '21
Peerless—March 3, '21
Pierce-Arrow—April 21, '21
Premier—Feb. 10, '21
Reo—Feb. 10, '21
May 19, '21
Roamer—Feb. 10, '21
Sayers—June 2, '21
Scripps-Booth—Feb. 3, '21
Sheridan—Feb. 3, '21
Stearns—Jan. 13, '21; May 5, '21; May 19, '21
Stephens—Jan. 13, '21; May 5, '21; May 19, '21
Templar—April 28, '21
Velie—Jan. 20, '21
Winton—May 26, 521

Additional Wiring Diagrams May Be Found in the Readers' Clearing House in This Issue

Automotive Repair Shop
Practical Maintenance Hints

Altering a Jack for Quick Lifting

The addition of a long handle and two wheels to an ordinary jack makes a fixture of rapid serviceableness for use in the automobile accessory or garage work. This fixture is also serviceable for use in the private garage when the owner desires to jack up the wheels for periodic inspection. The alterations consist of a five-foot section of wrought iron pipe flattened at one end and riveted to a plate of sheet steel about six by eight inches. The base of the jack is bolted to this plate or riveted to make it more secure. Two small steel wheels are secured to the plate by means of an attached bar as is shown.

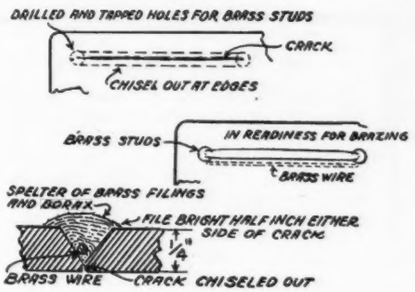
To lift a car the jack is simply pushed under the axle in a tilted position and the lever lowered down. This lifts the car and it remains lifted until the jack is removed in a manner the reverse of lifting. This method avoids crawling under the car to place the jack in position and working the handle up and down from this awkward position. The usual rachet lift is set at any desired height and is not changed except where cars with unusually high or low axles are to be worked upon.

A Hand Hoist for Oil Barrels

The dumping of the contents of a fifty gallon oil barrel into the measuring tank drum is not the simplest task; however, with the hoisting apparatus shown, this can be accomplished single handed. The device consists of a single lever and two runners which permit of lifting and rolling the barrel into position so the bung is directly over the filling opening in the measuring tank. The lever is made from two pieces of planking joined at the end with two small rollers at the opposite end.

The runners consists of two pieces of plank planed parallel and hinged to the lever. The ends of the runners are provided with blocks to hook to the edge of the measuring tank. A 12 or 15 in. space between the runners is sufficient width for balancing either steel or wooden oil barrels. A piece of chain and two staples fastened between the runners and lever limit the opening of the vertical support.

In operation the barrel is rolled on the hoist with the lever placed flat on the floor. The lever is then swung up by lifting at the extreme outer end. When vertical the chain will hold it into position while the barrel is rolled forward and the bung is opened.



Making a brazed repair of a crack

Simple Bearing Scraper

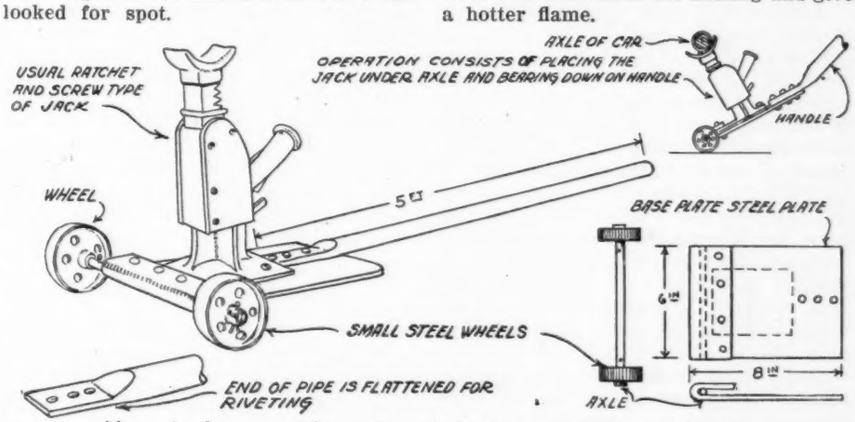
While it is true that the hand scraping of bearings is rapidly becoming a lost art, still it is necessary that the job sometimes be done in this way. A very efficient tool for the job, superior in many ways to the regular type of tool, can be made by breaking a piston ring into two or more pieces. The square edges are of razor like keenness and make a smooth non-chattering cut. An advantage is that the ring cuts where it is expected to and not at some unlooked for spot.

Making a Brazed Repair of a Crack

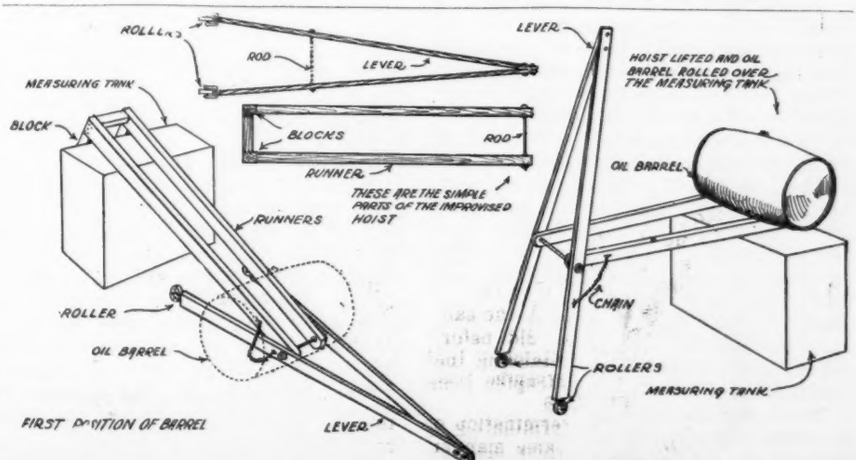
A brazed repair of a cracked part as a cylinder casting is not difficult when done in the following manner; it is not necessary to tear the motor down as is required for welding and preheating in the furnace previous to this welding. A method which gives excellent results and differs somewhat from the usual practice is illustrated below.

This consists in placing a small brass wire at the bottom of the seam and fusing the spelter around this. The fissure is first drilled out at the extreme ends, tapped and fitted with brass or copper studs.

The crack is chisled out to a depth of a quarter inch for the wire and spelter and filed bright for a half inch either side of the crack. The spelter consisting of borax and brass filings, is heaped up above the crack and a blow torch is applied until the spelter fuses and runs brazing the brass wire solidly into the fissure. If available, two blow torches should be applied, one at either side of the crack to localize the heating and give a hotter flame.



Above is shown an illustration of altering a jack for quick lifting



Above is shown a hand hoist for oil barrel

Legal Problems

Conducted by Wellington Gustin

CONTINUED DEALINGS IMPLIED AGENCY CONTRACT AFTER TERM —BUT PROOF MAY SHOW CHANGE IN PROVISIONS OF FORMER CONTRACT

IN a recent action by the Park Square Station against the American Locomotive Co., the former sought to recover commissions for the sale direct by the latter of taxicabs and trucks in violation of an alleged provision of a contract between them giving the former an exclusive agency. (Ill. A. 689.)

It appears that up to October, 1908, there existed a written contract giving the dealer a 20 per cent discount from the list price of the manufacturer on all automobiles purchased by it, together with the exclusive right of sale of defendant's automobiles in certain territory. From 1908 to January, 1910, the parties continued to do business as before without a written contract. In 1910 another written contract was entered into between the parties in which it was stipulated that commercial cabs and trucks were therein included within the dealer's exclusive privilege.

Therefore, it was contended by the dealer that the implied contract under which the parties dealt from October, 1908, to January, 1910, contained the same stipulation as to the exclusive right to sell trucks and taxicabs. But the trial court found that there was a plain understanding between the parties for the period from 1908 to 1910 that the defendant manufacturer might sell commercial cabs and trucks, to anyone, anywhere without compensation, commission, or liability of any kind to plaintiff. Therefore, it must be found that the implied contract contained this understanding, says the court, and it ruled that the dealer was not entitled to recover damages for the breach of the alleged stipulation as to the exclusive sale.

In passing upon the case, the Supreme Court of New Hampshire said that although trucks and taxicabs were included within the dealer's exclusive privilege under the written contract which terminated in 1908, the parties had the power to except them thereafter, as they did do in the written contract of 1910.

They could do the same under the contract by which they elected to govern their relations up to 1910. Whether they did so or not is a question of fact. The evidence showed that although the parties continued to do business in the same manner after 1908 as they did before, they did so upon the understanding that trucks and taxicabs were excepted from plaintiff's exclusive privilege.

Where parties, after the termination of a contract, proceed in the same manner, without any new contract, there is a presumption that they understand their relations are governed by the terms of the expired contract. But this presumption is one of fact, not of law, and proof will overcome it. The parties have the power to orally modify the terms of the original contract.

Evidence of continuance in employment or as tenant after the termination of an express contract furnishes a presumption of a continuance of the relation on the same terms, in the absence of any other evidence; but evidence of periodical settlement at a greater or a less rate would authorize a finding of a mutual understanding of a change in the price agreed to be paid for service or as rent. The same rule applies to the dealer herein. Judgment was rendered against the dealer.

At Your Service

SEEMINGLY kotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer, but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty points as may be submitted to him.

Repairman's Lien in Nebraska

A sells a new car to B at wholesale and B sells it to C at retail and C uses same and orders repairs put on car and accepts car O. K. and has same charged. Then being unable to pay B for the balance due on the car C turns car over to B for balance. Now C has not yet paid for the parts used and labor for installing them. C is not worth the amount of repairs which amounts to less than $50. Can B be made to pay for the repairs or to attach car for the bill? This is state of Nebraska.—H. O. Bauerle, Champion, Nebr.

In Nebraska the statute gives the repairman a lien upon a car for repairs or labor done on same. Under this lien he may either (1) retain possession of the car until the claim is paid, or, (2) he may deliver up the car and charge the debtor with the amount due, or otherwise, and he will be given a lien upon his filing his statement of the claim with amount due within 60 days after the charges accrue. However, the lien attaches to the car only from the date of the filing of the claim.

Now in your case it would appear that there have been other claims permitted to attach prior to the lien for repairs, and such prior claims would take precedence over the lien. B's claim for balance paid would come first, but if within the 60 days limit A should file his claim for lien, and he would be entitled to payment out of any balance of the proceeds of the car after B's prior claim for the unpaid purchase price has been satisfied.

CLAIMANTS OF TRUCKS NOT ENTITLED TO THEM AS AGAINST CREDITORS OF INVESTMENT COMPANY

IN a recent action the controversy arose between the receiver of the Commercial Delivery Co. on the one side, and the Morris Plan Co. of New York and H. G. Farnam and others—known in the case as the truck drivers—on the other side. (Straus Co. vs. Commercial Delivery Co. 112 A 417.)

When the receiver took charge of the assets of the Delivery Co. after it had been adjudged insolvent, he found in its garage certain motor trucks which he took possession of. The Morris Plan Co. and the truck drivers asked the court for possession of the trucks, the truck drivers alleging that the Delivery company had sold the trucks to them before the insolvency, and the Morris Plan Co., urging that it had purchased the trucks before the insolvency.

The receiver claimed that his company had not made an unconditional sale of the trucks to the truck drivers, but had leased them, reserving title to same until the several lessee truck drivers had fully performed the conditions of the leases, and he assented that all the provisions of the leases had not been complied with, and that the full amount of the purchase price had not been paid. He also denied that his company had sold outright to the Morris Plan Co. its remaining equities in the trucks.

The court of Appeals of New Jersey, on appeal to it, said the truck drivers were not entitled to the present possession of the trucks as against the receiver, who represents the creditors of the insolvent corporation. Also, it held that the assignment upon which the Morris Plan Co. bases its claim to the legal ownership and right of possession of the trucks did not operate as an out and out sale thereof, but was intended as a pledge of the Delivery company for the purpose of securing its indebtedness to the Morris Plan Co., that it was, in its legal effect, a chattel mortgage, and therefore void as against the receiver and the creditors of the Delivery company, because not recorded as required by the provisions of the New Jersey Chattel Mortgage Act, since there was no change in the possession of the property pledged.

Radiators on 1920 Trucks

Motor Age Maintenance Data Sheet No. 155

One of a series of weekly pages of information valuable to service men and dealers—save this page

Name and Model	Cap.	Radiator Make	Radiator Type
Gary, M	5	Chicago	Fin
G. M. C., 16	1	McCord	Tubular
G. M. C., 31	1½	McCord	Tubular
G. M. C., 41	2	McCord	Tubular
G. M. C., 71	3½	McCord	Tubular
G. M. C., 101	5	McCord	Tubular
Giant, 15	1	Ideal	Cellular
Giant, 14	1½	Ideal	Cellular
Giant, 16	2	Ideal	Cellular
Giant, 17	3½	Jackson	Cellular
Grant, 10	1½	Fedders	Cellular
Grant, 11	1½	Fedders	Cellular
Grant, 15	2	Fedders	Cellular
Grant, 16	2	Fedders	Cellular
Gramm-Bernstein, 15	1½	Long	Fin Tube
Hal-Fur, D	1	G & O	Fin
Hal-Fur, B	2½	G & O	Fin
Harvey, WEA	1½	Chicago	Fin Tube
Harvey, WFA	2½	Chicago	Fin Tube
Harvey, WHA	3½	Chicago	Fin Tube
Harvey, WKA	5	Chicago	Fin Tube
Hawkeye, K	1½	Ideal	ZZt
Highway Knight, A	4	R-T	Fin
Highway Knight, B	5	R-T	Fin
Huffman, C	1½	Livingston	Cellular
Huffman, B	1½	Livingston	Cellular
Independent, E	1½	Chicago	Cellular
Independent, F	2	Chicago	Cellular
Independent, F	1	Long	Fin
Independent, G	2	National	ZZt
Indiana, 12	1¼	McCord	Fin and Tube
Indiana, 20	2	McCord	Fin and Tube
Indiana, 25	2½	McCord	Fin and Tube
Indiana, 35	3½	McCord	Fin and Tube
Indiana, 51	5	McCord	Fin and Tube
Inland, D	2	Long	Fin
International, H	¾	Own	Tubular
International, F	1	Own	Tubular
International, K	1½	Own	Tubular
International, G	2	Own	Tubular
International, L	3½	Own	Tubular
J & J, D	2	Chicago	Fin Tube
Jackson	3½	Long	Tubular
Jumbo, 15	1½	Own	Tubular
Jumbo, 20	2	Own	Tubular
Jumbo, 25	2½	Own	Tubular
Jumbo, 30	3	Own	Tubular
Jumbo, 35	3½	Own	Tubular
Jumbo, 40	4	Own	Tubular
Kalamazoo, G20	1½	G & O	Tubular
Kalamazoo, H20	2½	G & O	Tubular
Kalamazoo, K20	3½	G & O	Tubular
Kankakee, EP	2½	Splitex	Honeycomb
Karavan, A	2½	Fedders	Tubular
Kelly Springfield, K40	3½	Long	Fin Tube
Kelly Springfield, K41	3½	Long	Fin Tube
Kelly Springfield, K42	3½	Long	Fin Tube
Kelly Springfield, K50	5	Long	Fin Tube
Kelly Springfield, K60	6	Long	Fin Tube
Kelly Springfield, K34	1½	Long	Fin Tube
Kelly Springfield, K38	2½	Long	Fin Tube
Keystone, 30	1½	McCord	Tubular
Kimball, AB	2	Flexo	Cellular
Kimball, AC	2½	Flexo	Cellular
Kimball, AK	3	Flexo	Cellular
Kimball, AE	4	Flexo	Cellular
Kimball, AF	5	Flexo	Cellular
K-Z	2½	Chicago	Tubular
Kissel Utility	1½	McCord	Fin Tube
Kissel Freighter	2½	McCord	Fin Tube
Kissel Heavy Duty	3½	McCord	Fin Tube
Kleiber	1	Perfex	Cellular
Kleiber	1½	Perfex	Cellular
Kleiber	2	Perfex	Cellular
Kleiber	2½	R-T	Tubular
Kleiber	3½	R-T	Tubular
Kleiber	5	R-T	Tubular
Knox, 35 Tract	...	Fedders	Cellular
Koehler, C	1¼	Gordan	Flat Tube
Koehler, M	2½	Gordan	Flat Tube
Larrabee, U	1½	Bush	Fin Tube
Larrabee, K	2½	Bush	Fin Tube
Larrabee, L	3½	Bush	Fin Tube
Larrabee, W	5	Bush	Fin Tube
L. M. C., 220	2½	Long	Fin
Luedinghaus, K	2	Own	.....
Maccar, L	1½	Own	Fin Tube
Maccar, H	2½	Own	Fin Tube
Maccar, M	3½	Own	Fin Tube
MacDonal, A20	15	Modine	Tubular
Mack, AB Worm	1½	Own	Cellular
Mack, AB Chain	2	Own	Cellular
Mack, AC	3½	Own	Tubular Ring
Mack, AC	5	Own	Tubular Ring
Mack, AC	6½	Own	Tubular Ring
Mack, AC	7½	Own	Tubular Ring
Mack Tract, AC	10	Own	Tubular Ring
Mack Tract, AB	5	Own	Cellular
Mack Tract, AC	7	Own	Tubular Ring
Mack Tract, AC	13	Own	Tubular Ring
Mack Tract, AC	15	Own	Tubular Ring
Master, JW	1½	Chicago	Tubular
Master, W & WL	2½	Chicago	Tubular
Master, D & DL	2½	Chicago	Tubular
Master, E & EL	3½	Chicago	Tubular
Master, A & AL	3½	Chicago	Tubular
Master, F & FL	5	Chicago	Tubular
Master, B & BL	5	Chicago	Tubular
Master, Tract	6	Chicago	Tubular
Maxwell, 1920	1½	Own	Tubular
Menominee, HT	1	Own	Fin Tube
Menominee, H	1½	Own	Fin Tube
Menominee, D	2	Own	Fin Tube
Menominee, G	3½	Own	Fin Tube
Menominee, J3	5	Own	Fin Tube
Moreland, 20N	1	Own	Cellular
Moreland, 20B	1½	Own	Cellular
Moreland, 20C	2½	Own	Cellular
Moreland, 20G	3½	Own	Cellular
Moreland, 20J	5	Own	Cellular
Muskegon, 2A	2	M-R	Cellular
Mutual, 2A	2	G & O	Fin Tube
Mutual, 2A	2½	G & O	Sq. Fin. Tube
Napoleon, 9	1	Chicago	Tubular
Napoleon, 11	1½	Chicago	Tubular
Nash, 2018	1	McCord	Fin
Nash, 3018	1½	McCord	Fin
Nash, 4018	2	McCord	Fin
Nelson LeMoon, F	1½	Chicago	Fin
Nelson LeMoon, F	2	Chicago	Fin
Nelson LeMoon, F	3½	Chicago	Fin
Nelson LeMoon, F	5	Chicago	Fin
Netco, H	2	E & N	Tubular
Netco, H	2½	R-T	Tubular
Niles, E	2	Fedders	Cellular
Noble, A20	1	Chicago	Tubular
Noble, B30	1½	Chicago	Tubular
Noble, C40	2	Chicago	Tubular
Noble, D50	2½	Chicago	Tubular
Noble, E70	3½	Chicago	Tubular
Northway, B2	2	G & O	Cellular
Northway, B3	3½	G & O	Cellular
Old Hickory, W	1¼	Long	Tubular
O. K., K	1½	R-T	Fin Tube
O. K., L	2½	R-T	Fin Tube
O. K., M	3½	R-T	Fin Tube

ABBREVIATIONS.—Can—Candler; ZZt—ZigZag Tube; E & M—English & Mersick; R-T—Rome & Turney; M. R.—Marlin-Rockwell.

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders: Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ace.....G	Guy..	6-3¼x5	123	32x4	$2975	$2975	....	$3680	$3680
Ace.....H	H-S...	6-3⅜x5	123	32x4	2975	2975	....	3680	3680
Ace.....L	H-S...	6-3¼x5	116	32x4	2260	2260	....	....	....
Allen.....Series 43	Own..	4-3½x5	110	32x4	‡1395	1395	....	....	2395
Ambassador.....R	Cont..	6-3½x5¼	136	32x5	....	†4500	$4500	....	6500
American.....C	H-S.	6 3¼x5	127	32x4	2195	2275	†2350	....	3150
Anderson.....Series 40	Cont.	6-3¼x4½	120	33x4	2195	1795	1895	2795	2795
Apperson.....8-21-S	Own..	8-3¼x5	130	34x4½	....	†3500	3500	4500	4500
Apperson...Anniversary	Own..	8-3¼x5	130	34x4½	....	†4250	4250	....	....
Auburn.....6-39	Cont..	6-3¼x4½	120	33x4	....	1695	†1695	2795	2795
Beggs.....20T	Cont..	6-3¼x4½	120	33x4	1775	1775	....	2675	2775
Bell.....4-32	H-S...	4-3½x5	114	31x4	....	1495	....	....	....
Bell.....6-50	H-S...	6-3¼x5	124	32x4	....	1695	....	....	....
Biddle.....B1	Buda.	4-3⅞x5½	121	32x4	3475	3475	....	....	3975
Birch Super-Four.....	H-S...	4-3½x5	117	33x4	1345	1345	†1395	2295	2295
Birch Light Four.....	Lelt..	4-3⅛x4½	108	30x3½	1195	1195	....	....	....
Birch Light Six.....	H-S...	6-3¼x5	117	33x4	1595	1595	....	....	....
Bour-Davis.....21S	Cont.	6-3½x5¼	126	33x4½	‡2385	†2385	2385	....	....
Brewster.....91	Own..	4-4 x5½	125	32x4½	‡7000	7000	....	....	10500
Briscoe.....4-34	Own..	4-3⅜x5	109	31x4	1285	1285	....	1885	1885
Brook.....S-21 A	Own..	2-3½x3½	90	28x3	395	....	....	....	....
Buick.....1922-41-5-6-7	Own..	6-3⅜x4½	118	33x4§	1495	1525	....	2135	2435
Buick.....1922-48-9-50	Own..	6-3⅜x4½	124	34x4½	....	....	1735	2325	2635
Bush.....E.C.4	Lyc..	4-3½x5	116	33x4	1295	1245	....	....	....
Bush.....E.C 6	Rut...	6-3½x5	116	33x4	1295	1575	....	2050	2150
			125	34x4½	3790	†3790	....	....	4950
Cadillac.....59	Own..	8-3½x5⅛	132	35x5	....	....	3940	....	5190
Carroll.....C	Roch..	6-3½x5	128	....	3985	3985	....	....	....
Carroll.....D	Roch..	6 3½x5	128	....	3185	3185	....	....	....
Case.....V	Cont..	6-3½x5¼	126	34x4½	....	†2650	2650	3400	3750
Chalmers.....6-30	Own..	6-3¼x4½	117	32x4	1495	1545	....	2295	2445
Chalmers.....6-30	Own..	6-3¼x4½	122	33x4½	....	....	1795	....	....
Champion.....Tourist	Lyc..	4-3½x5	113	32x3½	....	1250	....	....	....
Champion.....Special	H-S...	4-3½x5	118	32x4	†1595	1595	....	....	....
Chandler.....,Six	Own..	6-3½x5	123	33x4	1785	†1785	1785	2785	2885
Chevrolet.....490	Own..	4-3¼x4	102	30x3½	635	645	....	1155	1195
Chevrolet.....FB	Own..	4-3¼x5¼	110	33x4	1185	1185	....	1885	1885
Cleveland.....40	Own..	6-3 x4½	112	32x4	1295	1295	....	2195	2295
Climber Four.....	H-S ..	4-3½x5	117	....	1450	1385	....	....	....
Climber Six.....S	H-S...	6-3¼x5	125½	32x4½	2250	2250	....	....	....
Cole.....870	Nort..	8-3½x4½	127	33x5	3250	†3250	3250	4250	4450
Columbia.....D-C&CS	Cont..	6-3¼x4½	115	32x4	1795	1795	1795	2495	2595
Comet.....C-53	Cont..	6-3½x5¼	125	33x4½	....	2350	2450	....	3650
Commonwealth.....44	H-S...	4-3½x5	117	32x4	....	1595	....	....	2465
Crawford.....21-6-49	Cont..	6-3½x5¼	122½	32x4	3000	3000	....	....	4500
Crow-Elkhart....L63-65	Lyc..	4-3½x5	117	32x3½	‡1295	1295	....	....	....
Crow-Elkhart....S63-65	H-S...	6-3¼x5	117	33x4	‡1545	1545	....	....	2395
Cunningham.....V-4	Own..	8-3⅜x5	142	35x5	33x5	....	....	....	....
Daniels.....D-19	Own..	8-3½x5¼	132	34x4½	‡5350	†5350	5350	6250	6950
Davis.....61-67	Cont..	6-3¼x4½	120	33x4	†1995	1895	†2150	2795	2795
Dispatch.....	....	4-3⅜x5	120	34x4	1290	1350	1350	1525	1575
Dixie Flyer.....H-S-70	H-S...	4-3½x5	112	32x4	1445	1445	....	2295	2345
Dodge Brothers.....	Own..	4-3⅞x4½	114	32x3½	935	985	....	1585	1785
Dorris.....6-80	Own..	6-4 x5	132	33x5	....	†4785	4785	5800	6690
Dort.....17-12	D-Ly	4-3½x5	108	31x4	1115	1115	....	1635	1835
Dupont.....A	Own..	4-3⅛x5⅛	124	32x4½	3400	†3400	....	....	4900
Elcar.....K-4	Lyc...	4-3½x5	117	33x4	1300	1300	....	....	....
Elcar.....7-R	Cont..	6-3¼x4½	117	33x4	‡1700	1.00	....	2500	2600
Elgin.....K-1	Falls.	6-3½x4¼	118	33x4	†1595	1495	....	2395	2395
Essex.....	Own..	4-3⅜x5	108½	32x4	1445	1445	....	1950	2300
Fergus.....S-5-21	Own..	6-3¼x5	126	32x4½	....	Chassis	Price	8500	....
Ferris.....	Cont..	6-3½x5¼	130	32x4½	3350	....	*3350	....	4100
Ford.....T	Own..	4-3¾x4	100	30x3½	**370	††415	....	625	760
Franklin.....9-B	Own..	6-3¼x4	115	32x4	2550	26.0	2550	..	3650
Friend.....Four	Own..	4-3½x4½	112	32x3½	‡1285	1285	....	1985	2085
Gardner.....G	Lyc...	4-3½x5	112	32x3½	‡995	‡995	....	....	2145
Globe.....B-10	Supre.	4-3⅜x5	115	32x4	....	....	....	....	....
Grant.....Six	Own..	6-3½x4½	116	32x4	1550	1550	....	2450	2450
H.C.S.....21	Weid.	4-3⅝x5½	120	32x4½	2925	†2975	....	3650	3850
Halladay.....	Rut..	6-3½x5	116	33x4	....	2285	....	....	....
Handley-Knight.....	Kn'ht.	4-4½x4½	125	32x4½	....	....	2985	....	4185
Hanson Six.....60	Cont..	6-3¼x4½	121	32x4	2185	2185	‡2285	....	3165
Hanover Light.....	Own..	2 3½x4	190	28x3	345	....	....	....	....
Harroun.....A-A-2	Own..	4-3¼x5¼	106	30x3½	....	1195	....	....	....
Hatfield.....A-42	H-S..	4-3½x5	115	32x4	1695	1695	....	....	2595
Haynes.....47	Own..	6-3½x5	132	34x4½	3500	†2935	2935	....	4250
Haynes.....50	Own..	6-3½x5	121	33x4	....	1985	....	....	....
Haynes.....48	Own..	12-2⅝x5	132	34x4½	4200	†3635	3635	....	4950
Huffman.....R	Cont..	6-3¼x4½	120	32x4	1845	1795	....	....	2775
Holmes.....Series 4	Own..	6-3½x4½	126	34x4½	‡3350	....	3350	4250	4550
Hudson Super 6.....	Own..	6-3½x5	126	34x4½	†2250	....	2250	3125	3250
Hupmobile.....Series R	Own..	4-3¼x5½	112	32x4	1485	1485	....	2400	2485
Jackson.....638	Cont..	6-3¼x4½	121	32x4½	‡2685	1950	....	3760	3760
Jordan.....M	Cont..	6-3¼x4½	120	32x4	2250	2250	....	3.00	3300
Jordan.....F	Cont..	6-3½x5¼	127	32x4½	....	....	2475	....	3700
Kelsey.....GF	Own..	6-3⅛x4¼	118½	32x4	1800	1800	....	2700	2700
Kenworthy.....8-90	Own..	8-3 x5¼	130	32x4½	5000	5000	5250	6000	6000
Kessler.....K	Own..	4-3⅝x3¾	117	32x4	....	1995	....	....	2445
King.....J	Own..	8-3 x5	120	32x4½	2740	†2725	*2725	....	4035
Kissel.....45	Own..	6-3⅜x5½	124	32x4½	3475	†3475	2775	3775	3775
Kline Kar.....6-55-K	Cont.	6-3¼x4½	121	33x4	2290	2290	2290	3250	3290
Kurtz Automatic.....A	H-S...	6-3¼x5	122	32x4	....	2250	....	....	3000
LaFayette.....134	Own..	8-3¼x5¼	132	33x5	4850	4850	4850	6250	6500
Leach.....21-A-B &C	Cont..	6-3½x5¼	128	32x4½	‡5700	5200	5700	....	....
Lexington.....Series S	Cont..	6-3¼x4½	122	32x4	....	2285	....	3250	3250
Lexington.....Series T	Anst.	6-3¼x4½	128	32x4½	....	....	2985	....	4250
Liberty.....10-C	Own..	6-3½x5	117	32x4	1795	1795	†1885	2825	2850
Lincoln.....	Own..	8-3⅜x5	130	33x5	4300	4300	4300	4950	5400
Locomobile.....	Own..	6-4½x5½	142	35x5	....	†8600	8600	....	....
Lorraine.....21-T	H-S...	4-3½x5	114	32x4	1665	1665	....	2590	2590

NAME AND MODEL	Engine Make	Cylinders: Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Maibohm.....B	Falls..	6-3⅛x4¼	116	32x4	‡1575	$1575	†1750	$2395	$2395
Marmon.....34	Own..	6-3⅜x5½	136	32x4½	4185	†3985	3985	4875	5275
Maxwell.....25	Own..	4-3⅜x4½	109	30x3½	845	845	....	1445	1545
McFarlan.....1921	Own..	6-4½x6	140	33x5	6300	†6300	6300	7500	7500
Mercer.....Series 5	Own..	4-3¾x6¾	132	32x4½	4500	†4500	*4500	5700	6200
Merit.....	Cont..	6-3¼x4½	119	32x4	2245	†2245	....	....	....
Meteor.....R&RR	Dues..	4-4¼x6	129	32x4½	5500	5500	....	....	....
Metz.....M6	Rut...	6-3½x5	120	32x4	1995	1995	....	2795	2895
Mitchell.....F-40	Own..	6-3¼x5	120	33x4	‡1490	1490	†1790	2590	2690
Mitchell.....F-42	Own..	6-3½x5	127	33x4	....	....	1995	....	....
Moller.....A	Own..	4-2¾x4	100	27x3½	2000	....	....	....	....
Monitor.....B50-52	Cont..	6-3½x5	121	33x4	....	....	....	....	....
Monroe.....S-9 & 10	Own..	4-3¼x4½	115	32x3½	1295	1295	....	....	....
Monroe.....S-11 & 12	Own..	4-3¼x4½	115	33x4	....	....	....	2075	2175
Moon.....6-48	Cont..	6-3¼x4½	122	32x4	2285	2185	2685	3185	3185
Murray-Mac Six.....	Own..	6-3½x5¼	128	34x4½	4250	4250	4250	....	....
Nash.....681-7	Own..	6-3¼x5	121	33x4	1695	1695	†1850	2650	2895
Nash.....682	Own..	6-3¼x5	127	34x4½	....	....	1875	....	....
Nash Four.....41-4	Own..	4-3¼x5	112	32x3½	1295	1395	....	1985	2185
National Sextet.....BB	Own..	6-3½x5¼	130	32x4½	3750	†3750	3750	4900	4950
Nelson.....D	Own..	4-3½x4¾	104	32x4	....	1900	....	....	....
Noma.....1C	Cont..	6-3¼x4½	128	32x4½	3000	3200	....	....	4450
Northway.....	Own..	6-3½x5¼	128	33x5	4200	*4200	6000	5600	5400
Norwalk.....430-KS	Lyc..	4-3½x5	116	32x3½	....	1135	....	....	....
Oakland.....34-C	Own..	6-2½x4¾	115	32x4	1145	1145	....	1815	1815
Ogren.....6-60	Own..	6-3½x5¼	134	33x5	†3850	3750	3900	5000	5100
Oldsmobile.....43-A	Own..	4-3½x5¼	115	32x4	†1445	1445	....	2145	2145
Oldsmobile.....37A	Own..	6-2½x4¾	112	32x4	†1450	1450	....	2145	2145
Oldsmobile.....46	Own..	8-2½x4¾	122	33x4½	....	†2100	2100	....	3300
Oldsmobile.....47	Own..	8-2½x4½	115	32x4	....	††1695	....	2395	2495
Overland.....4	Own..	4-3⅜x4	100	30x3½	695	695	....	1000	1275
Packard.....Single-Six	Own..	6-3⅜x4½	116	33x4½	2075	2075	....	4150	4250
Packard.....Twin Six	Own..	12-3 x5	136	35x5	6000	*6000	6000	8200	8450
Paige.....6-42	Own..	6-3¼x5	119	32x4	1635	1635	1925	2450	2570
Paige.....6-66	Cont..	6-3⅜x5	131	33x4½	2975	2875	‡3295	3755	3830
Pan.....A	Own..	4-3¼x5	108	33x4	....	1500	....	....	....
Pan American.E&F-6-55	H-S...	6-3¼x5	121	33x4	2250	2250	....	....	....
Parenti.....1921	Own..	8-2¾x4¼	125	32x4	....	2000	....	....	3000
Paterson.....650	Cont.	6-3¼x4½	120	33x4	....	1895	1925	2895	2895
Peerless.....56-S-7	Own..	8-3¼x5	125	34x4½	....	†2990	2990	3680	3950
Peters.....	Own..	2-3½x3½	90	28x3	385	....	....	....	....
Piedmont.....4-30	Lyc..	4-3½x5	116	32x3½	....	1270	....	....	....
Piedmont.....6-40	Cont.	6-3¼x4½	122	32x4	....	1495	....	....	....
Pierce-Arrow.....	Own..	6-4 x5½	138	35x5	8000	†7500	7500	8500	9000
Pilot.....6-50	H-S..	6-3¼x5	126	32x4½	2285	2285	2335	3350	3400
Porter.....40	Own..	4-4⅜x6¾	142	35x5	6750	Chassis	a Price	....	....
Premier.....6-D	Own..	6-3⅜x5½	126¾	33x5	4600	†4600	4600	5600	6100
Premocar.....6-40 A	Falls..	6-3½x4¼	117	32x3½	....	1295	....	....	....
Raleigh.....A-6-60	H-S..	6-3¼x5	122	32x4½	2250	2250	....	3100	3200
Ranger.....A-20	Own..	4-3⅜x5	116	32x4	....	....	....	....	....
R & V Knight.....R	Own..	4-3⅜x5	116	32x4	....	2150	....	2850	2950
R & V Knight.....J	Own..	6-3½x4½	127	32x4½	3350	†3350	3350	4000	4200
Reo.....T-6	Own..	6-3¼x5	120	33x4	1850	1850	....	2700	2750
Revere.....C	Dues..	4-3⅜x6	131	32x4½	4850	4650	†4650	....	6500
Roamer.....6-54-E	Cont..	6-3½x5¼	138	32x4½	....	....	....	....	....
Romer.....	Cont..	6-3¼x4½	120	32x4	2000	2000	2100	2450	2750
Rock Falls.....14000	Cont..	6-3¾x5	132	35x5	....	....	....	....	....
Rolls-Royce.....	Own..	6-4½x4¾	143½	33x5	U. S.	Chassis	a Price	11750	....
Saxon.....125	Own..	4-3⅜x5	112	32x4	....	1495	....	2295	2295
Sayers Six.....DP	Cont..	6-3¼x4½	118	33x4	2495	2195	....	....	3295
Scripps-Booth...B-39-42	Nort..	6-2½x4¾	115	32x4	‡1275	1295	....	1950	2100
Seneca.....L & O	Lelt..	4-3½x4½	108	30x3½	1045	1045	....	....	....
Severin.....Six	Cont..	6-3½x5¼	122	33x4	1485	1485	....	2100	2250
Severin.....Six	Cont.	6-3½x5¼	122	33x5	2550	2550	2550	3250	3350
Sheridan.....4	Nort..	4-3¼x5¼	116	33x4	1485	1485	....	2060	2360
Sheridan.....8	Nort..	8-3½x4½	132	33x5	....	....	....	....	....
Skelton.....35	Lyc..	4-3½x5	112	32x3½	1295	1295	....	....	....
Southern Six.....660-2	H-S...	6-3¼x5	127	32x4½	2875	2875	2995	....	....
Standard.....J	Own..	8-3¼x5	127	34x3½	3400	†3400	3400	4500	4500
Stanley Steamer.....	Own..	2-4 x5	130	34x4½	....	3950	3950	5650	5775
Stanwood Six.....	Cont..	6-3¼x4½	118	33x4	2050	2050	....	2950	....
Stearns.....SKL4	Own..	4-3⅜x5⅝	125	34x4½	2550	2450	2675	3400	3700
Stephens.....90	Own..	6-3¼x4½	122	33x4½	2400	†2400	2100	3400	3400
Stevens Duryea.....E	Own..	6-4½x5½	138	35x5	8500	†8000	8000	9.00	9500
Studebaker.....EJ-40	Own..	6-3⅛x4½	112	32x4	1.00	1235	....	1695	1995
Studebaker.....EH-50	Own..	6-3½x5	119	32x4	1585	1635	†1635	2450	2550
Studebaker.....EG-60	Own..	6-3⅞x5	126	33x4½	....	....	1985	....	....
Stutz.....	Own..	4-4⅜x6	130	32x4½	3900	†4000	*4000	5500	....
Templar.....A-445	Own..	4-3⅜x5½	118	32x4	2885	2885	†2885	3785	3785
Texan.....A-38	Lyc..	4-3½x5	115	33x4	1195	1195	....	....	....
Texan.....C-12	H-S...	4-3½x5	115	33x4	1350	1350	....	....	....
Tulsa.....E-1-2-3	H-S..	4-3½x5	117½	33x4	1385	1385	....	....	....
Velie.....48	Cont..	6-3¼x4½	115	32x4	1885	1885	†2200	2885	2885
Velie.....34	Falls..	6-3½x4¼	112	32x3½	1485	1485	....	....	2485
Vogue.....6-55	H-S..	6-3¼x5	124	32x4	....	2285	2360	3050	3050
Vogue.....6-66	Cont..	6-3½x5¼	124	33x4½	....	2485	2560	3250	3250
Washington.....	Fal s..	6-3⅛x4¼	114	32x4	....	1685	....	....	....
Wasp.....2611	Wisc.	4-4¾x5½	132	33x5	....	†5500	....	....	....
Westcott.....C-48	Cont.	6-3½x5¼	125	32x4½	....	....	2990	....	4590
Westcott.....C-38	Cont.	6-3¼x4½	118	33x4	2290	2290	†2290	3390	3390
Wharton.....A	Curt..	8-4 x5	136	34x4½	....	†4885	4885	....	....
Wills-Sainte Claire.....	Own..	8-3¼x4	121	32x4½	3275	3200	....	....	....
Willys-Knight.....20	Own..	4-3⅜x4½	118	33x4	1895	1895	....	2550	2750
Winther.....61	H-S..	6-3¼x5	120	32x4½	....	....	2750	....	....
Winton.....25	Own..	6-3⅜x5½	132	35x5	4600	†4975	4600	5950	†5950

*—6-passenger. †—4-passenger. ‡—3-passenger. +Special Body. **—Price without starter and demountable rims. Price with starter and demountable rims $465. ††—Price without starter and demountable rims. Price with starter and demountable rims $510.

Engine Make: Anst.—Ansted. Cont—Continental. Curt—Curtiss. D.Ly—Dort Lycoming. Dues.—Duesenberg. GBS—Golden, Belknap & Swartz. H-S—Herschell-Spillman. LeR—Leroi. Lyc—Lycoming. Nort—Northway. Roch—Rochester. Rut—Rutenber. Supr—Supreme. Tee—Teetor. Wal—Walther. Weid—Weidely. Wisc—Wisconsin. §—Model 47—34x4½ Tires.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Acason, R	1	$2260	3¾x5½	36x3½	36x5	W
Acason, RB	1½	2485	3¾x5½	36x3½	36x6	W
Acason, H	2½	3295	4⅜x5⅜	36x4*	36x4d*	W
Acason, L	3½	4295	4⅜x5⅜	36x5*	36x5d*	W
Acason, M	5	5250	5 x6¼	36x6	40x12	W
Ace, C	1½	2295	3¾x5½	34x3½*	34x5*	W
Ace, A	2½	2795	4¼x5½	36x4*	36x7	W
Acme, G	¾	....	3¾x5	35x5†	35x5†	W
Acme, B	1	....	3¾x5	34x3½	34x5	W
Acme, F	1½	....	3¾x5	34x3½	34x5	W
Acme, A	2	....	4⅛x5¼	36x4	36x7	W
Acme, C	3½	....	4½x5½	36x5	40x10	W
Acme, E	5	....	4⅝x6	36x6	40x12	W
Akr'nMulti-Trk20	1	1995	4 x5¼	34x5	34x5	B
All-Power, C	3½	5800	4½x6	36x7	36x10	W
All-American, B-1	1	1795	3½x5	32x4	32x4	I
All-American C-1	1½	2195	3½x5	34x4	34x5	I
American, 25	2½	3575	4 x6	36x4*	36x4d*	W
American, 40	4	4575	4½x6	36x5*	36x5d*	W
Apex, G	1	1675	3½x5	33x5†	33x5†	I
Apex, D	1½	1915	3¾x5½	34x3½	34x4	I
Apex, E	2½	2695	4¼x5½	36x4	36x7	I
Apex, F	3½	3975	4½x6	36x5	36x10	I
Armleder, HW	2½	....	4¼x5½	36x4*	36x7*	W
Armleder, KW	3½	....	4½x6	36x5	36x5d	W
Armleder, 20	1	....	3¾x5¼	34x3½*	34x5*	W
Atco, B	1½	....	3¾x5¼	34x5†	36x6*	I
Atco, B1	1½	....	3¾x5¼	34x5†	36x6†	I
Atco, A	2½	....	4¼x5½	36x4†	36x8*	W
Atlas, M.D	1	....	3½x5	32x4½†	32x4½†	W
Atterbury, 20R	1½	2775	3¾x5	34x3½	34x5	W
Atterbury, 7CX	2½	3375	4½x5¼	36x4	36x4d	W
Atterbury, 7D	3½	4175	4½x5½	36x5	40x5d	W
Atterbury, 8E	5	5575	4¾x6	36x5	40x6d	W
Autocar, 21UF	1½-2	2300	4¾x4½*	34x4*	34x5*	D
Autocar, 21UG	1½-2	2400	4¾x4½*	34x4*	34x5*	D
Autocar, 26Y	....	4350	4¼x5½	34x5	36x10	D
Autocar, 26-B	....	4500	4¼x5½	34x5	36x10	D
Available, H1½	1½	2750	4 x5⅛	36x3½*	36x5*	W
Available, H2½	2½	3475	4 x5⅛	36x4*	36x8*	W
Available, H3½	3½	4475	4½x5½	36x5	40x5d	W
Available, H5	5	5375	4¾x6	36x6	40x12	W
Available, H7	7	6000	5 x6	36x6	40x14	B
Avery	1	....	3 x4	34x5†	34x5†	I
Beck, A. Jr.	1	1800	3¾x5	34x3½	34x4	I
Beck, C	2	2550	4½x5½	36x4	36x6	I
Bell, O	2½	2750	4½x5½	34x4	34x7	I
Bell, E	1½	2250	3½x5¼	34x3½	34x5†	I
Belmont, D	2	2675	3¾x5	34x3½*	34x6*	D
Belmont, F	3½	3525	4 x6	36x5*	36x5d*	D
Bessemer, G	1	1395	3½x5	35x5†	35x5†	I
Bessemer, H-2	1½	1995	3¾x5	36x3½	36x5	I
Bessemer, J-2	2½	2595	4⅛x5¼	36x4	36x4	I
Bessemer, K-2	4	3495	4½x5½	36x6	36x10	I
Bethlehem, K	1	....	3½x5	34x4½†	35x5	I
Bethlehem, G	2	....	4 x5¼	34x3½*	34x6*	I
Bethlehem, H	3	....	4 x5¼	36x4*	36x8	I
Bethlehem, J	4	....	4½x5½	36x5*	36x5d*	I
Bollstrom, 30	1½	2100	3¾x5¼	34x3½	34x6	I
Bollstrom, 50	2½	2800	4¼x5½	36x4	36x8	I
Bollstrom, 70	3½	3800	4½x6	36x5	36x10	I
Bollstrom, A-20	4	6000	5¾x7	40x8†	40x8†	I
Bollstrom, B21	4	5050	4½x5½	36x7	36x7	I
Bridgeport, A	1½	2350	3¾x5¼	34x3	34x6	W
Bridgeport, B	2½	2850	4¼x5½	36x4*	36x7*	W
Bridgeport, C	4	3650	4½x6	36x5	36x5d	W
Bridgeport, D	6	4500	4½x6	36x6	36x6d	W
Brinton, F	2½	3400	4½x5¼	36x4	36x7	W
Brockway, E	¾	1675	3¾x5	35x5†	35x5†	B
Brockway, S-4	1½	2250	3¾x5	36x3½*	36x5*	W
Brockway, K-5	2½	3200	4½x5½	36x4	36x7	W
Brockway, R-4	3½	4100	4½x5½	36x5	36x5d	W
Brockway, T	5	5250	4¾x6	36x6	40x6d	W
Capitol, G1½	1½	2975	3¾x5	35x5	38x7	W
Capitol, H2½	2½	3700	4¼x6	36x4	36x8	W
Capitol, K2½	2½	4250	4¼x6	36x6	42x9	W
Capitol, M3½	3½	4425	4¼x6	36x5	36x10	W
Case, ††	2	3000	4¼x5¾	36x6	38x7	I
Champion Light Commercial	½	1100	3½x5	32x3½	32x3½	I
Chevrolet, G	¾	820	3⅛x4	31x4†	34x4½†	B
Chevrolet, T	1	1225	3⅛x5¼	33x4†	35x5†	W
Chicago, C1½	1½	....	3¾x5⅛	36x3½*	36x5*	W
Chicago, C2½	2½	....	4 x5⅛	36x4*	36x7*	W
Chicago, C3½	3½	....	4½x5½	36x5	36x10	W
Chicago, D5	5	....	4½x5½	36x6	40x12	W
Climber, A 20	1½	2450	3½x5	30x6*	38x7*	I
Clydesdale, 18	¾	1890	3¾x5	34x5	34x5	W
Clydesdale, 32C	1	2375	3¾x5⅛	34x3½*	34x5*	W
Clydesdale, 42C	1½	2750	4 x5⅛	36x3½	36x5	W
Clydesdale, 65C	2½	3540	4¼x5½	36x4	36x7	W
Clydesdale, 65EC	2½	3775	4½x5½	36x4	36x7	W
Clydesdale, 90C	3½	4400	4½x5½	36x5	40x10	W
Clydesdale, 120C	5	5500	4¾x6	36x6	40x12	W
Collier, 18	1	....	3¾x5	34x4	34x5	W
Collier, 19	1½	....	3¾x5	36x4	36x6	W
Collier, 21	2	....	4½x5¼	36x4	36x7	W
Collier, 22	2½	....	4½x5¼	36x4	36x4	W
Columbia, H	1½	2350	3¾x5	35x5†	34x5	I
Columbia, G	2½	2850	4 x5¼	36x4	36x7	I
Comet	1½	1950	3¾x5	34x4	34x4	W
Commerce, T	¾-1½	1450	3¾x5	34x4½†	34x4½†	B
Commerce, 12	1½	1800	3¾x5	35x5†	35x5†	I
Commerce, 16	2	2150	3¾x5	35x5†	35x6†	I
Concord, A	1½	2700	4 x5½	36x3½	36x6	W
Concord B	2½	3600	4¼x5½	36x4	36x8	W
Concord AX	1½	3150	4 x5½	36x3½	36x6	W
Concord, BX	2½	3600	4½x5½	36x4	36x8	W
Cook, 41	2	3000	4 x5½	36x6†	38x7†	I
Corbitt, E	1	$2400	3¾x5	34x3½	34x4	W
Corbitt, D	1½	2800	3¾x5	36x3½	36x5	W
Corbitt, C	2	3500	4⅛x5¼	36x3½	36x7	W
Corbitt, B	2½	3650	4⅛x5¼	36x4	36x7	W
Corbitt, A	3½	4500	4½x5½	36x5	36x10	W
Corbitt, AA	5	5500	4¾x6	36x6	40x6d	W
Cyclone	1½	2800	3½x5	34x5†	36x6†	I
Dart, S	1½	....	3¾x5½	34x3½	34x6	W
Dart, M	2½	....	4¼x5½	36x4	36x7	W
Dart, W	3½	....	4½x6	36x5	36x10	W
Day-Elder, A	1	2225	3¾x5	34x3½	34x4	W
Day-Elder, B	1½	2425	3¾x5	34x3½	34x5	W
Day-Elder, D	2	2900	4⅛x5¼	36x4*	36x7	W
Day-Elder, C	2½	3125	4¼x5	36x4	36x7*	W
Day-Elder, F	3½	3950	4½x5½	36x5*	36x5d*	W
Day-Elder, E	5	4875	4½x6	36x5	36x6d	W
Dearborn, F	1½	2180	3¾x5⅛	34x4*	34x5*	W
Dearborn, 48	2	2590	3¾x5⅜	35x5†	34x7†	W
Defiance G	1	1975	3¾x5	35x5†	35x5†	I
Defiance, D	1½	2550	3¾x5	35x5†	36x6†	I
Defiance, E	2	2750	3¾x5	35x5†	38x7†	I
DeKalb, E2	2½	2250	4⅛x5¼	34x3½*	36x5*	W
DeKalb, E2½	2	2600	4¼x5¼	36x4*	36x6*	W
DeMartini 1½	1½	2600	3¾x5	34x3½	34x6	W
DeMartini 2	2	3300	4 x5½	36x3½	36x7	W
DeMartin :3	3	4250	4¼x5½	36x4	36x10	W
DeMartini 4	4	4800	4½x6	36x5	36x12	W
Denby, 12	1	2200	3¾x5	35x5	36x6	I
Denby, 33	1½	2300	3¾x5	35x5†	38x7†	I
Denby, 134	2	2800	3¾x5	36x3½	36x6	I
Denby, 25	3	3600	4⅛x5¼	36x4	36x7	I
Denby, 27	4	4600	4½x5½	36x5	36x5d	I
Denby, 210	5	5350	4½x5½	36x6	40x6d	I
Dependable, A	¾-1	1650	3½x5	34x5	36x6	W
Dependable, C	1½	2350	3¾x5¼	34x3½	34x5	W
Dependable, D	2	2650	4 x5½	34x5	36x6	W
Dependable, E	2½	2950	4¼x5½	36x4	36x7	W
Dependable, G	3½	3350	4½x6	36x6	38x7	W
Diamond T, O	1	2500	3¾x5¼	34x5†	36x6†	W
Diamond T, FS	1½	2960	3¾x5¼	36x3½	36x5	W
Diamond–T, T	1½	2650	3¾x5¼	36x3½	36x5	W
Diamond–T, U	2	3285	4 x5¼	36x4	36x7	W
Diamond–T, K	3½	4675	4¼x5½	36x5	36x5d	W
Diamond–T, EL	5	5400	4½x5½	36x6	40x6d	W
Diamond–T, S	5	5650	4¾x6	36x6	40x6d	W
Diehl, A	1	....	3½x5	34x4½	35x5	I
Diehl, B	1½	....	3½x5	36x6	36x6	I
Dispatch, F	1	1350	3¾x5	34x4†	34x4†	I
Doane	2½	4100††	4¼x5¾	36x5	36x7	C
Doane	3½	5100††	4⅜x5¾	36x5	36x5d	C
Doane	6	6000††	4⅜x6¾	36x6	40x6d	C
Dodge Brothers	½	1085††	3⅞x4½	33x4†	33x4†	B
Dorris, K-4	2	3400	4¼x5½	36x4	36x7	W
Dorris, K-7	3½	4400	4¼x5½	36x5	36x10	W
Double Drive B	3	4000	4¼x5½	6	6	W
Douglas G	1½	2050	3¾x5½	36x5*	37x8*	W
Douglas I	3	3250	4¼x5½	36x6*	37x8*	W
Duplex, A	1½	2775	4 x5¼	35x5†	38x7†	W
Duplex, E	3½	4250	4¼x5½	36x8	36x8	I
Duty, 21	2	1490	3½x5	34x3½	34x5	I
Eagle, 100–2	2	2275	3¾x5¼	34x4*	34x7*	I
Erie, A	2½	....	4¼x5½	36x4	36x4d	W
F.W.D., B	3	4200	4⅜x5½	36x6	36x6	B
Facto, 1921	2½	2895	4¼x5½	36x4*	36x8*	W
Fageol, (Cal.)	1½	3000	3¾x5¼	34x3½	34x6*	W
Fageol, (Cal.)	2½	3900	4¼x5¾	34x4	36x7	W
Fageol (Ohio) Md	2½	3900	4⅜x5¾	36x4*	36x4*	W
Fageol (Ohio) Hd	3½	5000	4½x6¼	36x5*	40x5d*	W
Fageol, (Cal.)	3½	5000	4½x6¼	36x5	36x5d	W
Fageol, (Cal.)	5	5700	4½x6¼	36x6	40x6d	W
Famous, B10	1	1800	3½x5	36x3½*	36x4*	I
Famous, B12	1½	2100	3¾x5	36x3½	36x5*	I
Fargo, R	2	2500	3¾x5	36x4	36x6	I
Federal, SD	1	2500	3¾x5	35x5†	36x6†	W
Federal, TE	1½	2725	4⅛x5¼	36x3½	36x5	W
Federal, UE	2	3025	4⅛x5¼	36x4	36x7	W
Federal, WE	3½	3950	4½x5½	36x5	36x5d	W
Federal, X 2	5-6	5350	4¾x5	36x6	40x6d	W
Ford, TT	1	495	3¾x4	30x3½*	32x4½*	W
Forschler, A	1	....	3½x5	34x3	34x4	W
Forschler, AX	1½	....	3½x5	36x3½	36x5	W
Forschler, B	2	....	4⅛x5¼	36x4	36x7	W
Forschler, BX	3	....	4⅛x5¼	36x4	36x8	W
Front Drive C	1½	2800	3¾x5½	5	4	W
Fulton, A	¾	1750	3½x5	35x5†	35x5†	B
Fulton, C	2	2350	3½x5	34x4	34x6	I
G & J**	2	3850	4x5¼	36x4	36x7	W
G & J**	3½	5175	4½x5½	36x5	36x5d	W
G.M.C., K15	¾	....	3½x5½	33x4½†	33x4½†	B
G.M.C., K16	1	....	3½x5½	34x5†	34x5†	B
G.M.C., K41	2	....	4 x5½	36x4*	36x7*	W
G.M.C., K71	3½	....	4½x6	36x5	40x5d	W
G M.C.,K101	5	....	4½x6	36x5	40x6d	W
Garford, 15	¾	1590	3⅝x5⅜	34†5†	34x5†	W
Garford, 25	1¼	2090	3¾x5½	36x3½	36x4	W
Garford, 70–H	2	3190	4¼x5½	36x4	36x7	W
Garford, 68D	5	5200	5 x6½	36x6	40x6d	W
Garford, 77D	3½	4390	4½x6	36x5	36x6d	W
Garford, 150–A	7½	5500	5x6½	36x6	40x7d	C
Gary, F	1	2100	3¾x5	36x3½	36x4	W
Gary, I	1½	$2550	4 x5½	36x3½	36x5	W
Gary, J	2½	3150	4¼x5½	36x4	36x7	W
Gary, K	3½	4050	4½x6	36x5	40x5d	W
Gary, M	5	5150	5 x6½	36x6	40x6d	W
Gersix M	1½	3100	4 x5½	36x3½	36x7	W
Gersix K	2½	3500	4½x5½	36x4	36x8	W
Gersix	3½	4500	4½x6	36x5	40x12	W
Giant, 15–A	1½	2250	3¾x5	34x3½	34x5	W
Giant, 16	2	3150	4⅛x5¼	36x4	36x7	W
Giant, 17	3½	4150	4½x5½	36x5	36x5d	W
Globe D–20	¾	....	3⅜x5	33x4½†	33x4½†	..
Golden West, G	3½	4500	4½x5½	36x6	36x6	W
Golden West, H	3½-4	5000	4½x6	36x6	36x6	W
Golden West, GH	3	5000	4½x6	36x7	36x7	W
Golden West, T	4	5500	4¾x6	36x6	36x6	W
Golden West, K	7	6000	5½x6	36x6	36x6	W
Golden West, HA	7	6000	4½x6	36x6	36x10	W
Gove, A1	2½	....	4⅛x5¼	36x4*	36x7*	I
Graham Bros. A	1½	2495	3¾x5	35x5†	36x6†	I
Gramm–Bern., 10	1	1495§	3½x5	33x5†	33x5†	B
Gramm–Bern., 15	1½	2050§	3¾x5	36x3½*	36x5*	I
Gramm–Bern., 65	1½	2725§	3¾x5	36x3½*	36x5	W
Gramm–Bern., 20	2	3175§	4½x5¼	36x4*	36x7*	W
Gramm–Bern., 25	2½	3575§	4¼x5½	36x4*	36x4d*	W
Gramm–Bern., 35	3½	4375§	4½x5½	36x5	40x5d*	W
Gramm–Bern., 50	5	5275§	4¾x6	36x6	40x6d*	W
G.W.W.	1½	2100	3¾x5½	35x5	35x5	I
Hahn, J4	1	....	3¾x5	34x5*	34x5*	W
Hahn, CD	1½	....	4½x5¼	36x3½*	36x6*	W
Hahn, EE	2½	....	4½x5½	36x4*	36x8*	W
Hahn, F	3½	....	4½x5½	36x5*	36x10 *	W
Hahn, EF	5	....	4¾x6	36x6	40x12	W
Hal Fur, E	1	2350	4 x5	35x5†	35x5†	W
Hal Fur, B	2½	3250	4¼x5½	35x5*	38x7*	W
Hal Fur, F	3½	4250	4½x5½	36x6†	40x10†	W
Hall	1½	3100	3¾x5	34x5†	38x7†	W
Hall	2½	3275	4⅛x5¼	36x4	36x6	W
Hall	3½	4100	4½x5½	36x5	36x5d	W
Hall	5	5100	4½x5½	36x5	40x6d	W
Hall	7	5100	4½x5½	36x5	40x6d	C
Harvey, WEA	1½	2550	4⅛x5½	34x3½	34x5	W
Harvey, WFA	2½	3309	4¼x5½	36x4	36x7	W
Harvey, WHA	3½	4300	4½x6	36x5	36x5d	W
Harvey, WKA	5	5200	4½x6	36x6	40x6d	W
Hawkeye, K	1½	2365	3¾x5¼	34x3½*	34x5*	I
Hawkeye, M	2	2915	4¼x5½	36x4*	36x6*	I
Hawkeye, N	3½	4345	4½x6	36x5*	36x10*	I
Hendrickson, K	5	4800	....	....	....	..
Hendrickson, N	2½	3150	4¼x5¾	36x4*	36x7*	W
Hendrickson, M	3½	3975	4¼x5¾	36x5*	36x5d*	W
Highway,Knight A	4	....	4 x6	36x5	36x6d	W
Highway,Knight B	5	....	4 x6	36x5	40x6d	W
Higrade, A17	¾	1850	3½x5	32x4½	32x4½	W
Higrade, A18	1	2100	3½x5	35x5†	35x5†	W
Higrade, B20	1½	2500	4½x5¼	35x4†	36x6†	W
Huffman, B	1½	1995	3¾x5	34x3½	34x6	W
Huffman, C	1½	1795	3¾x5½	34x3½	34x6	I
Hurlburt	1½	....	4 x5½	34x4	34x5	W
Hurlburt	2½	....	4¼x5½	36x4	36x4d	W
Hurlburt	3½	....	4½x6	36x5	36x5d	W
Hurlburt	5	....	4½x6	36x5	40x6d	W
Huron Erie	1½	2425	3¾x5¼	36x3½	36x5	I
Huron Mich.	2½	2950	4¼x5½	36x4	36x7	I
Indep'd't(Iowa),G	1½	2010	3¾x5¼	34x3½	34x5	I
Indep'd't(Ia.),H.I.	2½	2940	4½x5¼	34x4	34x6	I
Indep't'd(Iowa), B	1	1665	3½x5	34x3½	34x4	W
Indep't'd(Ohio), F	1½	2585	3¾x5	36x3½	36x5	W
Indep't'd(Ohio) H	2½	3285	4¼x5¼	36x4	36x4d	W
Indep'd't(Ohio) K	3½	4285	4½x5½	36x5	36x5d	W
Indiana, 12	1¼	....	3¾x5¼	34x3½*	34x5*	W
Indiana, 20	2	....	4½x5½	36x4*	36x7*	W
Indiana, 25	2½	....	4½x5½	36x4*	36x8*	W
Indiana, 35	3½	....	4⅝x5½	36x5*	36x5d*	W
Indiana, 51	5	....	5 x6¼	36x5*	40x6d*	W
Inland, D	2	2950	4 x5	34x5	34x6	I
International, S	¾	1500	3½x5	34x5†	34x5†	I
International, 21	1	1874	3½x5¼	36x3½	36x3½	I
International, 31	1½	2032	3½x5¼	36x3½	36x4	I
International, 41	2	2395	3½x5¼	36x3½	36x5	I
International, 61	3	2750	4¼x5	36x4*	36x6*	I
International, 101	5	3600	4¼x5	36x5	40x10	I
J & J, D	2	3250	4 x5	34x4*	34x6	I
Jackson, 4WD	3½	4550	4½x5½	36x7	36x7	B
Jumbo, 15	1½	2425	3¾x5¼	36x3½	36x5	I
Jumbo, 20	2	2675	3¾x5¼	35x5†	38x7†	I
Jumbo, 25	2½	3090	3¾x5¼	36x4	36x7	I
Jumbo, 30	3	3590	4¼x5½	36x6†	42x9†	I
Jumbo, 35	3½	4080	4½x6	36x5	36x10†	I
Jumbo, 40	4	4730	4 x6	38x7†	44x10	I
Kalamazoo, G–1	1½	2495	3¾x5	34x4	34x5	W
Kalamazoo, G–2	1½-2	3100	3¾x5	36x4*	36x5*	W
Kalamazoo, H	2½	3700	4 x6	36x4	36x8	W
Kalamazoo, K	3½	4300	4¼x6	36x5	36x10	W
Karavan, A	2½	....	4¼x6	36x4	36x8	W
Kearns, H	¾	1600	3½x4½	32x4½†	32x4½†	I
Kearns, N	1½	2200	3½x5	34x3½	34x6	I
Kelly-Springfield K-31	1½	2900	3¾x5¼	36x3½	36x6	C
Kelly–S., K-34	1½	2900	3¾x5¼	36x3½	36x6	W
Kelly–S., K-36	2½	3250	3¾x5¼	36x4	36x4d	W
Kelly–S., K-35	2½	3250	3¾x5¼	36x4	36x4d	C
Kelly–S., K-40	3½	4200	4½x6½	36x5	40x5d	C
Kelly–S., K-41	3½	4200	4½x6½	36x5	40x5d	I
Kelly–S., K-42	3½	4200	4½x6½	36x5	40x5d	W
Kelly–S., K-45	4	4550	4½x6½	36x5	40x6d	C
Kelly–S., K-50	5	4900	4½x6½	36x6	40x6d	C
Kelly–S, K-60	6	5100	4½x6½	36x6	40x7d	C
Keystone, 40	2	2450	3¾x5¼	34x5†	38x7†	I
Kimball, AB	2	3675	4 x6	36x4	36x7	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body. §—Price includes several items of equipment.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Kimball, AC	2½	$3975	4¼x6	36x4	36x8	W
Kimball, AK	3	4500	4½x6	36x4	36x10	W
Kimball, AE	4	5000	4¾x6	36x5	40x12	W
Kimball, AF	5	5975	5 x6	36x6	40x7d	W
Kissel, Express	1	1985††	3½x5½	34x5†	34x5†	W
Kissel, Utility	1½	2775	3½x5½	36x3½	36x5	W
Kissel, Freighter	2½	3475	4¼x5½	36x4	36x7	W
Kissel, H. D.	4	4475	4¼x5½	36x5	36x5d	W
Kleiber, AA	1	2600	4½x5¼	34x3½*	34x5*	W
Kleiber, A	1½	3100	4½x5¼	36x3½*	36x6*	W
Kleiber, BB	2	4000	4½x5¼	36x4*	36x7*	W
Kleiber, B	2½	4200	4½x5½	36x5*	36x8	W
Kleiber, C	3½	4900	4½x5½	36x5	36x5d	W
Kleiber, D	5	5600	5 x6¼	36x6	40x12	W
Koehler, D	1½	2285	3½x5	34x3½	34x5	W
Koehler, M	2½	3365	4 x5½	36x4	36x7	W
Koehler, MCS	2½	3450	4 x5½	36x4	36x7	W
Koehler, F	3½	4450	4½x5½	36x5	36x10	W
Koehler, MT, Trac	5	3450	4 x5⅜	36x4	36x7	W
K-Z, 1	1	2250	3½x5	34x3½	34x5	W
K-Z, 1½	1½	2750	3¾x5	36x4	36x6	W
K-Z, 2½	2½	3250	4½x5¼	36x4	36x8	W
K-Z, 3½	3½	4250	4½x5½	36x5	40x10	W
K-Z, 5	5	5200	4½x5½	36x6	40x6d	W
L.M.C., 2-20	2½	2540	4½x5¼	36x4	36x4d	I
Lange, B	2½	3350	4½x5¼	36x4*	36x6*	C
Larrabee, U	1½	2400	3¾x5	34x3½	34x5	W
Larrabee, K	2½	3400	1¼x5¼	36x4	36x7	W
Larrabee, L	3½	4200	4½x5½	36x5	36x5d	W
Larrabee, W	5	5100	4¾x6	36x6	40x6d	W
Lion, L	1	2350	3¾x5½	35x5†	35x5†	W
Luedinghaus, C	1	2100	3½x5	35x5†	35x5†	W
Luedinghaus, W	1½	2700	3¾x5¼	34x3½*	34x5*	W
Luedinghaus,	2-2½	3150	4¼x5¾	36x4*	36x7*	W
Maccar, L	1½	2025	4¼x5¼	36x4	36x6	W
Maccar, H-2	2½	3750	4½x5½	36x4	36x4d	W
Maccar, M-2	3½	4500	4½x6	36x5	36x5d	W
Maccar, G	5	5500	4¾x6	36x5	40x6d	W
MacDonald, A	7½	5750	4½x6	40x7	40x14	I
Mack, AB D.R.	1½	3450	4 x5	36x4	36x3½d	D
Mack, AB Chain	1½	3000	4 x5	36x4	36x3½d	C
Mack, AB Chain	2	3300	4 x5	36x4	36x4d	C
Mack, AB D.R.	2	3750	4 x5	36x4	36x4d	D
Mack, AC Chain	3½	4950	5 x6	36x5	40x5d	C
Mack, AC Chain	5	5500	5 x6	36x6	40x6d	C
Mack, AC Chain	6½	5750	5 x6	36x6	40x12	C
Mack, AC Chain	7½	6000	5 x6	36x7	40x7d	C
Mack Trac., AB	5	3400	4 x5	36x4	36x4d	C
Mack Trac., AC	7	4950	5 x6	36x5	40x5d	C
Mack Trac., AC	10	5500	5 x6	36x6	40x6d	C
Mack Trac., AC	13	5750	5 x6	36x6	40x12	C
Mack Trac., AC	15	6000	5 x6	36x7	40x7d	C
Mapleleaf, AA**	2	4150	4 x5¼	36x4	36x7	W
Mapleleaf, BB**	3	4775	4¼x5½	36x4	36x4d	W
Mapleleaf, CC**	4	5770	4½x5½	36x5	36x5d	W
Mapleleaf, DD**	5	6825	4½x5½	36x6	40x6d	W
Master, JW	1½	2690	4½x5½	34x3½	34x5	W
Master, W	2½	3290	4¼x5½	34x4	36x7	W
Master, D	2½	3540	4¼x5½	34x4	36x7	D
Master, A	3½	4190	4½x6	36x5	40x5d	W
Master, E	3½	4640	4½x6	35x5	40x5d	D
Master, B	5	5290	4¾x6½	36x6	40x6d	W
Master, F	5	5440	4¾x6½	35x5	40x6d	D
Master Trac., T	6	3740	4¼x5½	36x7	36x4d	D
Maxwell, 1½	1½	1332	3⅝x4¼	32x3	32x4	W
Menominee, HT	1	2080	3¾x5	34x3½	36x5	W
Menominee, H	1½	2725	4 x5	36x3½	36x5	W
Menominee, D	2	3245	4 x6	36x4	36x8	W
Menominee, G	3½	4270	4½x6	36x5	36x10	W
Menominee, J3	5	5450	4¾x6	36x6	40x12	W
Moline, 10	1½	2450	3½x5	34x5†	36x6†	I
Moreland, 20N	1	2850	3¾x5	35x5†	36x6†	I
Moreland, 21B	1½	3125	4⅛x5¼	36x3½	36x6	W
Moreland, 21C	2½	3900	4½x5½	36x4	36x8	W
Moreland, 21H	3½	4975	4¾x6	36x5	40x5d	W
Moreland, 21J	5	5350	4¾x6	36c6	40x6d	W
Mutual, 2B	2	3450	4 x6	36x4	36x8	W
Mutual, 2BP	2½	4150	4 x6	38x7†	42x9†	W
Napoleon, 7	¾-1	1350	3½x5	38x4	33x4†	I
Napoleon, XX-7	1	1535	3½x5	35x5*	35x5*	I
Napoleon, 11	1½	1860	3½x5	35x5*	36x6*	I
Nash, 2018	1	1895	3¾x5½	35x5	36x6	I
Nash, 3018	2	2550	3¾x5¼	36x6	40x8	I
Nash, Quad.	2	3250	4¼x5½	40x8	40x8	I
*Nelson, F1½	1½	....	4½x5¼	36x3½	36x5	W
*Nelson, F2	2	....	4½x5¼	36x4	36x7	W
*Nelson, F3½	3½	....	4½x5½	36x5	36x5d	W
*Nelson FC5	5	....	4¾x6	36x6	40x6d	W
Netco, D	2	3100	4¼x5¼	36x4*	36x7*	W
Netco, H	2½	3500	4½x5½	36x4*	36x8*	W
New York, M	1½	....	4½x5¼	36x3½	36x5	W
New York, N	2-2½	....	4½x5¼	36x4	36x4d	W
Niles, E	2	3000	4¼x5¼	36x4*	36x7*	W
Noble, B30	1½	2585	3¾x5¼	36x3½	36x5	W
Noble, C40	2	2825	4 x5½	36x4	36x7	W
Noble, D50	2½	3150	4¼x5½	36x4	36x8	W
Noble, E70	3½	4030	4½x6	36x5	36x10	W
Northway, B-2	2	3400	4 x6	36x4	36x4d	W
Northway, B-3	3½	4400	4 x6	36x5	40x5d	W
Northwestern W	2	3300	4¼x5¼	34x4	36x6	W
Northwestern WS	2½	3500	4½x5½	36x4	36x8	W
Norwalk, 25E	1	1695	3½x5	34x3½	34x4	W
Norwalk, 35E	1½	2025	3½x5	34x3½	34x3½d	W
Norwalk, 35E Spec	1½	2285	3¾x5¼	34x3½	34x5	W
O. K., K1	1½	2675	4 x5½	36x3½†	36x5†	W
O. K., L1	2½	3450	4¼x5½	36x4	36x8	W
O. K., M1	2½	4250	4½x6	36x5	36x5d	W
Ogden, A1	1½	$2550	3¾x5	36x3½	36x5	W
Ogden, E	2½	3250	4½x5¼	36x4	36x7	W
Old Hickory, W	1	2175	3¾x5	36x3½*	36x4*	W
Old Reliable, A	1½	2350	4 x5	34x4	36x6	W
Old Reliable, B	2½	3500	4¼x6	34x4	36x4d	W
Old Reliable, C	3½	4250	4¼x6	36x5	36x5d	W
Old Reliable, D	5	5250	4¾x6	36x6	40x6d	W
Old Reliable, KLM	7	6000	4¾x6¼	36x6	40x7d	C
Oldsmobile Econ.	1	1500	3½x5¼	35x5†	35x5†	I
Olympic, A	2½	3500	4¼x5½	36x4	36x7	W
Oneida, A-9	1¼	2350	3¾x5½	36x3½	36x5	W
Oneida, B-9	1¾	2915	4 x5¼	36x4	36x7	W
Oneida, C-9	2½	3390	4 x5¼	36x4	36x7	W
Oneida, D-9	3½	4345	4½x5½	36x5	36x10	W
One da, E-9	5	5460	4½x5½	36x6	40x12	W
Orleans, A	1½	2750	3¾x5½	36x3½	36x5	W
Orleans, B	2½	3250	4x5¼	36x4*	36x7*	W
Orleans, C	3½	3750	4½x5½	36x4½	36x8	W
Orleans, D	5	4250	4½x5½	36x6	40x8	W
Oshkosh, A	2	3750	3½x5	36x6†	36x6†	4
Oshkosh, AA	2	3850	3½x5	36x6†	36x6†	4
Oshkosh, B	2½	4150	4 x5¼	38x7†	38x7†	4
Oshkosh, BB	2½	4300	4 x5⅛	38x7†	38x7†	4
Packard, EC	....	3700	4⅜x5½	36x4	36x7	W
Packard, ED	....	4450	4½x5½	36x5	36x5d	W
Packard, EF	....	5550	5 x5½	36x6†	40x6d†	W
Packard, EX	....	4200	4⅜x5½	36x6†	40x8†	W
Paige, 52-19	1½	2880	4 x5¼	34x3½	34x6	W
Paige, 54-20	2½	3400	4¼x5½	34x4	34x4d	W
Paige, 51-18	3½	4285	4½x5½	36x5	36x5d	W
Parker, F20	2	3500	4 x6	34x4	36x4d	W
Parker, J20	5½	4400	4½x6	36x5	40x5d	W
Parker, M20	5	5500	4¾x6	36x6	40x6d	W
Patriot, Revere	¾	1785	3¾x5	35x5†	35x5†	W
Patriot, Lincoln	1½	2450	4 x5¼	34x3½*	34x5*	W
Patriot, Washg'n	2½	3450	4½x5½	36x4*	36x7*	W
Piedmont, 4-30	1½	1085	3½x5	34x4†	34x4†	W
Pierce-Arrow,	2	3750	4 x5½	36x4	36x4d	W
Pierce-Arrow	3½	4950	4½x6¾	36x5	36x5d	W
Pierce-Arrow	5	5700	4½x6¾	36x5	40x6d	W
Pioneer, 59	1	1650	3¾x4¼	32x4½†	32x4½†	W
Pittsburger, B 21	2½-3	3800	4½x5¼	36x5*	36x7*	W
Pony	¾	400	2¾x4	28x3†	28x3†	C
Power, F	1½	....	3¾x5¼	36x6	36x6	W
Power, C	3½	....	4¼x5½	36x5	40x10	W
Premocar, B-143	1½	2475	3½x5	36x6†	36x6†	W
Rainier, R-11	¾	2150	3½x5	35x5†	35x5†	W
Rainier, R-15	3½	4500	4½x5½	36x5	36x5d	W
Rainier, R-19	1	2350	3½x5	34x3½	31x4	W
Rainier, R-16	1½	2600	3¾x5	34x3½	34x5	W
Rainier, R-18	2	2950	4¼x5¼	34x4	34x6	W
Rainier, R20	2½	3600	4½x5¼	34x4	34x7	W
Rainier, R17	5	5250	4½x6	36x6	36x6d	W
Ranger, TK-20-2	2	....	3¾x5	36x6†	36x6†	W
Reo, F	¾-1½	1385	4⅛x4½	34x4½†	34x4½†	B
Reliance, 10A	1½	2500	4 x5½	36x3½	36x5	I
Reliance, 20B	2½	3200	4¼x5½	36x4	36x4d	I
Republic, 10	1	1695	3¾x5	35x5†	35x5†	I
Republic, 10Exp.††	1	2035	.....	35x5†	35x5†	I
Republic, 11X	1½	2295	3¾x5	34x3½	34x5	I
Republic, 19	2½	2795	4½x5¼	36x4	36x7	I
Republic, 20	3½	3845	4½x5½	36x5	36x10	I
Riker, B	3	4600	4¼x6	36x5	36x5d	W
Riker, BB	4	4800	4¼x6	36x5	36x6d	W
Rowe, CW	1½	3000	3¾x5	36x6†	36x6†	W
Rowe, C. D. W.	2	3300	4 x5	34x4	36x3½d	W
Rowe, G. S. W.	3	4150	4 x6	34x5	36x5d	W
Rowe, G. P. W.	3	5250	3¼x5‡	38x7†	42x9†	W
Rowe, HW	4	4500	4¼x6	36x5	36x6d	W
Rowe, F. W.	5	5500	4½x6	36x6	40x6d	W
Rumely, A	1½	2720	3¾x5¼	36x3½	36x5	W
Samson, KO 15	¾	865	.....	32x4	32x4	B
Samson, E 25	1¼	1395	.....	35x5	35x5	B
Sandow, G	1	2295	3¾x5	34x3½	34x5	W
Sandow, CG	1½	2590	3¾x5	34x4	34x6	W
Sandow, J	2½	3275	4¼x5¼	36x4	36x7	W
Sandow, M	3½	4295	4½x5½	36x5	36x5d	W
Sandow, L	5	4975	4½x5½	36x6	40x6d	W
Sanford, 25	2½	3350	4½x5¼	36x4	36x4d	W
Sanford, 35	3½	4200	4½x5½	36x5	36x5d	W
Sanford, 50	5	5100	4¾x6	36x5	40x6d	W
Schacht, 2-Ton	2	3550	4¼x5½	36x4	36x7	W
Schacht, 2½-Ton	2½	3850	4¼x5½	36x4	36x4d	W
Schacht, 3½-Ton	3½	4350	4¼x6	36x5	36x5d	W
Schacht, 5-Ton	5	5350	4½x6	36x5	40x6d	W
Schwartz, A	1	1685	3½x5	33x4½†	33x4½†	B
Schwartz, BW	1½	2600	3¾x5¼	34x3½*	34x7*	W
Schwartz, C.W.S.	2½	3200	4¼x5½	36x4	36x8	W
Schwartz, DW	5	4900	4½x6	36x6	40x12	W
Selden, 1½A	1½	2360	3¾x5	34x3½	34x5	W
Selden, 2½A	2½	3425	4¼x5¼	36x4	36x7	W
Selden, 3½A	3½	4175	4½x5½	36x5	36x10	W
Selden, 5A	5	5600	4¾x6	36x6	40x12	W
Seneca, M20	½	1020	3¼x4½	30x3½†	30x3½†	B
Service, 220	1	2415	3½x5⅛	34x3½	34x5	W
Service, 15	¾-1	1840	3¾x5	34x4½	35x5	B
Service, 31	1½	2985	4 x5½	36x3½	36x6	W
Service, 36	1½	3415	4¼x5½	35x5†	38x7†	W
Service, 51	2½	3475	4¼x5½	36x4	36x7	W
Service, 71	3½	$4285	4¼x5½	36x5	36x5d	W
Service, 76	3½	4485	4½x6	36x5	36x5d	W
Service, 10	5	5275	4½x6	36x6	40x6d	W
Signal, NF	1	2475	4¾x5	34x5†	36x6†	W
Signal, H	1½	2925	4½x5½	34x4	36x6	W
Signal, J	2½	3275	4½x5½	34x4	36x8	W
Signal, M	3½	4275	4½x5½	36x5	40x5d	W
Signal, R	5	5300	4¾x6	36x6	40x6d	W
Southern, 10	1	2 90	3¾x5	34x3½	34x4	W
Southern, 15	1½	2590	3¾x5½	36x6†	34x4	W
Southern, 20	2	2990	4¾x5¼	36x6†	40x8*	W
Standard, 1-K	1-1½	1950	3¾x5	34x3½*	34x5*	W
Standard, 76	2½-3	3100	4½x5¼	36x4*	36x7*	W
Standard, 66	3½-4	4000	4½x5½	36x5	36x10	W
Standard, S-K	5-6	5250	4¾x6	36x6	40x12	W
Sterling, 1½	1½	3200	4 x5¾	36x3½	36x5*	W
Sterling, 2	2	3500	4 x5¾	36x4	36x6	W
Sterling, 2½	2½	3650	4¾x5¾	36x4*	36x4d*	W
Sterling, 3½	3½	4650	4½x6¼	36x5*	40x5d*	W
Sterling, 5-W	5	5500	5 x6¼	36x6*	40x6d*	W
Sterling, 5-C	5	6000	5 x6¼	36x6	40x6d	C
Sterling, 7½	7½	6500	5 x6¼	36x6	40x7d	C
Stewart, 11	¾	1350	3½x4½	32x4†	32x4†	I
Stewart, 15	1	1875	3½x5	35x5†	35x5†	I
Stewart, 9	1½	2200	3¾x5	34x3½	34x5	I
Stewart, 7	2	2800	4½x5¼	34x4	34x7	I
Stewart, 7-X	2½	2950	4½x5½	34x4	34x7	I
Stewart, 10	3½	3850	4½x5½	36x5	36x5d	I
Stewart, 10-X	3½	3850	4½x6	36x5	36x5d	I
Stoughton, A	1	1995	3¾x5¼	34x4½†	35x5†	W
Stoughton, B	1½	2350	3¾x5¼	36x3½	36x5	W
Stoughton, D	2	2800	4 x5⅛	36x4	36x7	W
Stoughton F	3	3600	4¼x5½	36x5†	36x5d	W
Sullivan, E	2	3350	4¼x5½	36x4*	36x7*	W
Sullivan, H	3½	4650	4½x6	36x5	36x5d	W
Superior, D	1	1650	3¾x5	34x4½†	34x4	I
Superior, E	2	2600	4⅛x5¼	36x4	36x6	I
Super Truck, 50	2½	3300	4 x6	36x4	36x8	W
Super Truck, 70	3½	4300	4¼x6	36x5	40x5d	W
Super Truck, 100	5	5300	4¾x6	36x5	40x12	W
Super Truck 150	7½	6300	5 x6	36x6	40x7d	W
Texan, A38	¾	1095	3½x5	33x4	33x4	I
Texan, TK39	1½	1550	3½x5	36x6	38x7	W
Tiffin, GW	1½	2695	4½x5¼	36x3½	36x5	W
Tiffin, MW	2½	3580	4½x5¼	36x4	36x3½d	W
Tiffin, PW	3½	4760	4½x5½	36x5	40x5d	W
Tiffin, F50	5	5850	4¾x6	36x6	40x6d	W
Tiffin, F60	6	6050	4¾x6	36x6	40x12	W
Titan, HT	3½	4550	4½x6	34x4*	40x5d	I
Titan, HD	6	5400	4½x6	36x5	40x6d	I
Titan, TS	2½	3400	4¼x5½	34x4*	36x4d	I
Tower, J	1½	3000	4¼x5¼	35x5	38x7	W
Tower, H	2½	3475	4½x5¼	36x4	36x7	W
Tower, G	3½	4400	4½x5½	36x5	36x5d	W
Traffic, C	2	1595	3¾x5	34x3½*	34x5*	I
Transport, 20	1	1850	3¾x5½	34x3½	34x4	I
Transport, 30	1½	2250	3¾x5	36x3½	36x5	I
Transport, 50	2½	2785	4¼x5½	36x4	36x7	I
Transport, 70	3½	4195	4½x6	36x5	36x10	I
Traylor, B	1½	2500	3¾x5½	34x3½	34x5	W
Traylor, C	2	3000	4 x5½	36x4	36x7	W
Traylor, D	3	3500	4½x5½	36x4	36x8*	W
Traylor, E	4	4700	4½x6	35x5	40x10	W
Traylor, F	5	5100	4½x6	36x6	40x6d	W
Triangle, AA	¾-1	1600	3¼x5	35x5†	35x5†	I
Triangle, A	1½	2350	3¾x5¼	34x3½*	34x6*	I
Triangle, C	2	2700	3¾x5¼	36x4*	36x6*	I
Triangle, B	2½	2950	4 x5¾	36x4*	36x7*	I
Triumph, HB	2	2900	3¾x5¼	36x4	36x7	W
Triumph, HC	1½	2550	3¾x5¼	36x3½	36x5	W
Triumph, G	1	1995	3¾x5¼	34x5†	34x5†	W
Twin City, B.W.	2	3000	4 x5½	36x4	36x7	I
Twin City, A. W.	3½	4400	4½x6	36x5	40x5d	W
Twin City, FWDB	3½	4750	5½x6	36x6	36x6	I
Twin City, FWDA	5	5250	5½x6	36x7	36x7	I
Ultimate, A	2	3200	4 x5½	36x3½	36x6*	W
Ultimate, AJ	2	3250	4¼x5½	35x5†	38x7†	W
Ultimate, B	3	3750	4¼x5½	36x4*	36x4d*	W
Ultimate, BL	3	3850	4¼x5½	36x4*	36x4d*	W
Union, F W	2½	3490	4 x6	36x5*	36x8*	D
Union, H W	4	4485	4½x6	36x6	40x12	D
Union, J W	6	5800	5 x6	36x6	40x14	D
United, A	1½	2445	3¾x5½	36x3½	34x5*	I
United, B	2½	3150	4¼x5½	36x4*	36x7*	I
United, C	3½	3975	4¼x5½	36x5	36x5d	I
United, V	5	5100	4½x6	36x6	40x6d	I
U. S., N	1½	2475	3¾x5	36x3½	36x5*	I
U. S., R	3	3795	4 x5¼	36x4	36x4d	W
U. S., S	4	4595	4½x5½	36x5	36x5d	W
U. S., T	6	5850	4½x6½	36x6	40x6d	W
Velie, 46	1½	2200	3¾x5	36x3½	36x5	I
Veteran, E**	1-1½	3500	3¾x5¼	35x5†	36x6†	W
Veteran, A**	2-2½	4000	4¼x5½	36x4*	36x7*	W
Veteran, D**	2½-3	4400	4¼x5½	36x4*	36x7*	W
Veteran, H**	3½-4	5600	4¼x6	36x5	36x5d	W
Victor, A	1½	2050	3¾x5	34x4	34x5	I
Vim, 29	½	1355	3¾x4½	31x4†	31x4†	W
Vim, 31	1	2475	3¾x5⅛	35x5†	35x5†	W
Vim, 22	2	3150	3¾x5½	36x4	36x6	W
Vim, 23	3	3950	4¼x5½	36x5	36x5d	W
Vulcan, 25	2½	4000	4¼x6	36x4	36x8	W
Vulcan, 25P	3	4800	4¼x6	36x6	40x8	W
Walker-Johnson, B	2½	3500	4¼x5½	36x4	36x8	W
Walter, S	5	5600	4½x6¼	36x6	40x6d	I
Waltham, E	1½	2350	3¾x5¼	36x6†	38x7†	W
Ward-LaF., 2B	2½	3590	4¾x5¾	36x4	36x7	W
Ward-LaF., 4A	3½	4690	4½x6¼	36x5	36x5d	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body. §—Price includes several items of equipment.

*Nelson Le Moon

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Ward-LaF., 5A	5	$5590	5 x6¼	36x6	36x6d	W
Watson, E	1	1865	3¾x5¼	34x4½†	34x4½††	W
Watson, N	3½	4250	4½x5½	36x5	36x10	W
Western, W1½	1½	2550	4⅛x5¼	36x3½*	36x5*	W
Western, L1½	1½	2550	3¾x5	36x3½*	36x5*	W
Western, W2½	2½	3250	4⅛x5¼	36x4	36x7	W
Western, L2½	2½	3250	4¼x6	36x4	36x7	W
Western, W3½	3½	4250	4½x6	36x5	40x5d	W
White, 15	¾	2400	3¾x5⅛	34x5†	34x5†	B
White, 20	2	3250	3¾x5⅛	36x4*	36x7	D
White, 40	3½	4200	3¾x5¾	36x5	40x5d	D
White, 45	5	4500	4¼x5¾	36x6	40x6d	D
White Hick., E	1	2450	3¾x5	34x5†	34x5†	W
White Hick., H	1½	2750	3¾x5	36x3½	36x5	W
White Hick., K	2½	3350	4⅛x5¼	36x4	36x5	W
Wichita, K	1	2300	3¾x5¼	36x3*	36x4*	W
Wichita, L	1½	2600	3¾x5¼	36x3½*	36x5*	W
Wichita, M	2	2800	3¾x5¼	36x3½*	36x6*	W
Wichita, R	2½	3000	3¾x5¼	36x4*	36x7*	W
Wichita, RX	2½	$3600	4¼x6	36x4*	36x8*	W
Wichita, O	3½	4000	4¼x6	36x5*	36x5d*	W
Wichita, S	5	5000	4½x6	36x6	40x6d	W
Wilcox, AA	1	2100	3¾x5½	36x4*	36x4*	W
Wilcox, B	1½	2775	4¼x5	36x4	36x5	W
Wilcox, D	2½	3300	4¼x5	36x4*	36x3½d*	W
Wilcox, E	3½	4250	4½x6	36x5*	36x5d*	W
Wilcox, F	5	5200	4¾x6½	36x5	40x6d	W
Wilson, F	1½	2270	3¾x5	36x3½	36x5	W
Wilson, EA	2½	2825	4⅛x5¼	36x4	36x7	W
Wilson, G	3½	$3685	4½x5½	36x5	36x5d	W
Wilson, H	5	4520	4¾x6	36x6	40x6d	W
Winther, 751	¾	1795	3½x5	34x4½†	35x5†	I
Winther, 430	1½	2850	3¾x5	32x4	32x4	I
Winther, 39	1½	2450	3¾x5	34x3½	34x5	I
Winther, 49	2	3250	4 x5	34x4	34x4d	I
Winther, 450	2½	3690	4 x5	34x5	36x6	I
Winther, 70	3½	4200	4 x6	36x5	36x5d	I
Winther, 109	5	5250	4½x6	36x6	40x5d	I
Winther, 140	7	5900	5 x6	36x6	40x7d	I
Witt-Will, N	1½	2750	3¾x5	36x3½*	36x5*	W
Witt-Will, P	2½	3250	4⅛x5¼	36x3½*	36x7*	W
Wolverine, J	1	2240	3½x5	34x3	34x4	I
Wolverine, J	1½	2495	3¾x5	34x3½	34x5	I
Wolverine, J	2	2750	3¾x5	34x4	34x7	I
Wolverine, J	2½	3475	4¼x5½	36x5	36x10	I
Wolverine, L	3½	4150	4½x5½	36x5	36x10	I
Yellow Cab M2	¾	2050	3¾x5	32x4	32x4	B
Yellow Cab M4	1¼	2350	3¾x5	34x4½	34x4½	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body. §—Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
All-In One	16-30	$1975	3	Clim.	4-5• x6½	GDK	3-4
Allis-Chalm..B	6-12	925	2	LeR.	4-3½x4½	Gas.	1
Allis-Chal.G.P	6-12	850	2	LeR.	4-3½x4½	Gas.	1-2
Allis-Chalm.	12-20	1495	2	Mid.W	4-4½x5¼	Gas.	2-3
Allis-Chalm.	18-20	2150	4	Own	4-4¾x6½	GorK	3-4
Allis-Chalm	10-18	875	4	Own	4-4¾x6½	G,K	4
Allwork 2-G	14-28	....	4	Own	4-4¾x6	GorK	3
Allwork C	14-28	....	4	Own	4-5 x6	GorK	3
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x6½	GorK	4
Appleton	12-20	1500	4	Buda	4-4¼x5½	G,K	2-3
Aro 1921	3-5	550	4	Own	1-4½x5	Gas.	1
Aultman-T.	15-30	....	4	Clim.	4 5 x6½	G,K	4
Aultman-T.	22-45	....	4	Own	4-5½x8	G,K	6
Aultman-T.	30-60	....	4	Own	4 7 x9	G,K,D	8
Automot. B-3.	12-24	1785	4	Herc.	4-4 x5⅛	Gas.	2-3
Avery.SR.Cul	5-10	....	4	Own	4-3 x4	G,K	..
Avery Cult-C	....	....	3	Own	6-3 x4	G,K	..
Avery B	5-10	....	4	Own	4-3 x4	G,K	2
Avery C	....	....	4	Own	6-3 x4	G,K	..
Avery	8-16	....	4	Own	2-5½x6	G,K,D	2-3
Avery	12-20	....	4	Own	4-4¾x6	G,K,D	2-3
Avery	12-25	....	4	Own	2-6½x7	G,K,D	3-4
Avery	14-28	....	4	Own	4-4½x7	G,K,D	3-4
Avery	18-36	....	4	Own	4-5½x6	G,K,D	4-5
Avery	25-50	....	4	Own	4-6½x7	G,H,D	5-6
Avery	45-65	....	4	Own	4-7¾x8	G,K,D	8-10
Bates	15-25	....	4	Own	4-4¼x6	Ker.	3
Bates Mule. F	18-25	....	*2	Midw	4-4⅛x5¼	Gas.	3
Bates Mule H	15-25	....	4	Midw	4-4⅛x5¼	Gas.	3
Bates Mule G	25-35	....	*2	Midw	4 4½x6	Gas.	com.
Bean	8-16	....	*1	Own	4-3⅞x4	G,K	2-3
Beeman G	2-4	340	4	Own	1-3½x4½	Gas.	½
Best	30	....	*2	Own	4-4¾x6½	G,K,D	4
Best	60	....	*2	Own	4-6½x8½	G,K,D	8-9
Boring 1921	....	1850	3	Wauk	4-4¾x5¾	GorK	2
Burn-Oil 1921	15-30	1650	4	Own	2-6¾x7	Ker.	3-4
Capital	15-30	1000	2	Own	4-4¾x6	Gas.	33
Case	10-18	1090	4	Own	4-3⅞x5	GorK.	2
Case	15-27	1680	4	Own	4-4½x6	GorK	3
Case	22-40	3100	4	Own	4-5½x6¾	GorK	4-5
Caterpillar T11	25	....	*2	Own	4-4¾x6	Gas.	4
Caterpillar T16	40	....	*2	Own	4-6½x7	Gas.	6
Centaur	5-2½	495	2	N Way	2-4½x4½	G or K	1-9
Chase	12-25	....	3	Buda	4-4¼x5½	GorK	2-3
Chicago 40	40	2500	4	Own	4-4½x6	Gas.	4
Cletrac W	12-20	1495	*2	Own	4-4 x5½	G,K,D	2-3
Dakota 4	15-27	1750	3	Dom.	4-4¾x6	Gas.	3
Dart B.J.	15-30	....	4	Buda	4-4½x6	Gas.	3-4
Depue A	20-30	2500	4	Buda	4-4½x6	Gas.	4
Dill D	20	2480	4	Cont.	4-4½x5½	Gas.	3
Dill R.W.	20-	2980	4	Midw.	4-4½x6	Gas	3
Do-It-All	4-6	595	..	Own	1-4½x5	Gas.	..
Eagle F	12-22	1390	4	Own	2-7 x8	GorK	3-4
Eagle F	16-30	1850	4	Own	2-8 x8	GorK	4-5
E-B AA	12-20	....	4	Own	4-4¾x5	GorK	3
E-B Q	12-20	....	4	Own	4-4¾x5	GorK	3
E-B	16-32	....	4	Own	4-5¼x7	GorK	4
Evans	18-30	2000	4	Buda	4-4½x6	G,K	3
Fageol D	9-12	1525	4	Lyc.	4-3½x5	Gas.	2
Farm Horse	18-30	1885	4	Clim.	4-5 x6½	G,K	3-4
Farquhar	15-25	....	4	Buda	4-4½x6	G,K,D	3-4
Farquhar	18-35	....	4	Own	4-6 x8	G,K,D	4-5
Farquhar	25-50	....	4	Own	4-7 x8	G,K,D	6-7
Fitch 4	20-35	....	4	Clim.	4-5 x6½	GorK	3-4
Flour City	20-35	....	4	Own	4-5¼x6	Ker.	4-6
Flour City	30-50	....	4	Own	4-6¾x7	Ker.	6-8
Flour City	40-70	....	4	Own	4-7½x9	Ker.	8-1
Fordson	.. 20	625	4	Own	4-4x5	G,K	2
Fox E	20-40	1300	4	Own	4-5½x7½	G or K	4
Franklin G	18-30	4000	*2	Clim.	4-5 x6½	G or K	3-3
Franklin C	18-30	3350	*2	Clim.	4-5x6½	G or K	3-4
Franklin G 2	18-30	4350	2	Clim.	4-5 x6½	G or K	3-4
Frick A	12-20	....	4	Erd.	4-4 x6	G,K	2-3
Frick C	15-28	....	4	Beav.	4-4¾x6	G,K	3-4
[illegible] G	14-28	1485	4	Wauk.	4-4½x5¾	GorK	3
Belt A	18-36	2150	4	Wauk.	4-4¾x6¾	GorK	4
Gray 1920	18-36	....	3	Wauk	4-4¾x6¾	Gas.	4
Ground Hog	19-31	$2000	4	Erd.	4-4 x6	GorK	3
Gt. Western St	20-30	1950	4	Beav.	4-4¾x6	K.	4
Hart-Parr 20	-20	995	4	Own	2-5¼x6½	K.D	3
Hart-Parr 30	15-30	1595	4	Own	2-6½x7	K,D	3
Heider C	9-16	....	4	Wauk	4-4¼x5¾	G,K	2
Heider C	12-20	....	4	Wauk	4-4½x6¾	G,K	3
Heider Cult	6-10	....	4	LeR.	4-3½x4½	Gas.	1
Hicks	20-30	....	4	....	4-4½x6	KorG	4
Huber Light 4	12-25	1385	4	Wauk	4-4½x5¾	GorK	3
Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas.	3
Illinois, Super-Drive C	18-36	2500	4	Clim.	4 4-5 x6½	G,K	4
Imperial E	40-70	5000	4	Own	4-7½x9	G,K,D	10
Indiana F	5-10	....	2	LeR.	4-3⅛x4½	Gas.	1-2
International.	8-16	1000	4	Own	4-4¼x5	G,K,D	2
International.	15-30	1950	4	Own	-5¼x8	G,K,D	4
J-T N	20-40	3485	*2	....	4-4¾x6	G,K,D	3-4
Klumb F	16-32	....	4	Clim.	4-5 x6½	....	..
LaCrosse M	6-12	900	4	Own	2-4 x6	G,K	1
LaCrosse G	12-24	1250	4	Own	2-6 x7	GorK	3
Lauson	12-25	1495	4	Midw.	4-4⅛x5¼	Gas.	3
Lauson	15-25	1685	4	Beav.	4-4½x6	GorK	3-4
Lauson 21	15-30	1985	4	Beav.	4-4¾x6	GorK	3-4
Leader B	12-18	1095	4	Own	2-6 x6½	G,K,D	2-3
Leader N	16-32	1985	4	Clim.	4-5 x6½	G,K	3-4
Leader GU	18-35	2775	*2	Clim.	4-5x6½	G,K	3-4
Leonard E	20-30	2530	4	Buda	4-4½x6	G,K	3
Liberty A	18-32	2475	4	Clim.	4-5 x6½	G,K	4
Linn W	60	5600	*	Wauk.	4-5 x6¼	Gas.	6
Little Giant. B	16-22	2200	4	Own	4-4½x5	K.	4
Little Giant. A	26-35	3300	4	Own	4-5½x6	K.	6
Lombard	85-150	....	*2	....	6-5½x6¾	Gas.	16
Lombard	50	....	*2	....	4-4¾x6½	....	6-10
Magnet B	14-28	1875	4	Wauk	4-4½x6¼	K&G	3
Master Jr	5-10	585	..	LeR.	-2⅜x4	Gas.	1
MerryGar1921	2	230	2	Evin	1-2⅜x2½	Gas.	..
Minne All-P	12-25	1325	4	Own	4-4½x7	GorK	3
Minne. Gen.P.	17-30	....	4	Own	4-4¾x7	GorK	3-4
Minne. Med.Duty	22-44	....	4	Own	4-6x7	GorK	5-6
Minne. HeavyDuty	35-70	....	4	Own	4-7½x9	GorK	8-9
Mohawk 1921	8-16	785	4	Light	4-3¼x4½	KorG,	1-2
Moline Univ D	9-18	1075	2	Own	4-3½x5	Gas.	2-
Moline Orch.	9-18	1075	2	Own	4-3½x5	Gas.	2-3
Motor Macult.	1½	225	2	Own	1-2¾x3½	Gas.	..
Motox	15-30	2250	4	Buda	4-4½x6	Gas.	3-4
NB 1	3-6	425	4	Own	2-3¼x4	Gas.	¾
NB 2	3-6	425	4	Own	2-2¾x4	Gas.	¾
Nichols-Shep. 20-42	20-42	3100	4	Own	8 x10	GorK	3-6
Nichols Shep. 25-50	25-50	3460	4	Own	9 x12	GorK	4-7
Nilson Jr. E	15-25	1775	4	Wauk	4-4¼x5¾	G or K	3
Nilson Senior	20-40	2675	5	Wauk	4-5 x6¼	G,K	4
Oil Pull K	12-20	1485	4	Own	2-6 x8	K,D	3
Oil Pull H	16-30	2285	4	Own	2-7 x8½	K,D	4
Oil Pull G	20-40	3175	4	Own	2-8 x10	K,D	5-6
Oil Pull E	30-60	4590	4	Own	2-10x12	K,D	8-10
Oldsmar GarK	2½-5	395	4	Own	1-5½x5½	Gas.	⅔
Oliver A	15-30	....	*2	Beav.	4-4½x6	GorK	3-4
Once Over Tiller Mark 6	12-25	3000	4	Strns	4-4½x6	Gas.	2
Parrett K	15-30	1950	4	Pitt	4-4½x6	G,K	3
Peoria L	12-25	1785	4	Clim.	4-5 x6½	G,K	3
Pioneer G	18-36	....	4	Own	4-5½x6	G,K,D	4
Pioneer C	30-60	....	4	Own	4-7 x8	Gas.	10
Planet Jr.	5-10	950	2	LeRoi	4-3½x4½	Gas	1
Plowman A	15-30	1995	4	Buda	4-4½x6	G,K	3-4
Port Huron A	12-25	1700	4	Chief	4-4¾x6	G,K	3
Post D	12-20	$1800	4	Wauk	4-4¼x5¾	GorK	2
Prairie Dog L	9-18	650	3	Wauk	4-3¾x5½	Gas.	2
Prairie Dog D	15-30	1250	4	Wauk	4-4½x6½	Gas.	3
Ranger Cul. T-20	8-16	....	4	LeR.	4-3½x4½	Gas.	1
Reed	15-30	2250	4	Dom	4-4¾x6	K.	3-4
Reed A-1	18-36	2400	4	Dom	4-5 x6	Gas.	4
Reliable	10-20	985	4	Own	2-6 x7	Ker.	2
Rex	12-25	1600	4	Wauk	4-4¼x5¾	GorK	3
Russell	12-24	....	4	Own	4-4½x5¾	GorK	2-3
Russell	15-30	....	4	Own	4-5 x6½	GorK	3-4
Russell	20-35	....	4	Own	4-5½x7	GorK	4-5
Russell	30-60	....	4	Own	4-8 x10	GorK	8-10
Samson M	.....	995	4	Nov.	4-4 x5½	G,K	2
Sandusky J	10-20	1250	4	Own	4-4¼x5½	G,K,D	2
Sandusky E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Shawnee Com.	6-12	....	2	LeR.	4-3½x4½	Gas.	10
Shawnee Com.	9-18	....	2	Gray	4-3½x5	....	..
Shelby C	10-20	....	4	Erd.	4-4 x6	GorK	2-3
Shelby D	15-30	....	4	Beav.	4-4¾x6	G,K	3
Short Turn	20-40	1500	3	....	4-4¾x6	G,K	3
Square T A	18-35	2075	3	Clim.	4-5 x6½	K,G	3
Steady Pull	12-24	1485	4	....	4-4 x5	Gas.	3
Stinson 4E	18-36	1835	4	Beav.	4-4¾x6	G,K	4
Stone	20-40	....	4	Beav.	.....	G,K	4
Tioga 3	15-27	2625	4	Wisc.	4-4½x6	Gas.	3-4
Titan	10-20	1000	4	Own	2-6½x8	G,K,D	3
Topp B	30-45	3500	4	Wauk	4-4¾x6¾	Gas.	3-4
Toro Cultivator	6-10	....	3	LeR.	4-3½x4½	Gas.	2
Townsend	10-20	....	2	Own	4-6½x7	Ker	2-3
Townsend	15-30	....	2	Own	4-7 x8	Ker	3-4
Townsend	25-50	....	2	Own	4-8½x10	Ker	4-8
Traction Motor	40-50	....	4	....	8-3¼x5	Gas.	4-5
Traylor TB	6-12	815	4	LeR.	4-3½x4½	Gas.	1
Triumph H	18-36	2450	2	Erd.	4-4¾x6	Ker.	4
Trundaar 10	25-40	4250	*2	Wauk	4-5 x6¼	G or K	4
Turner 1921	14-25	1295	4	Buda	4-4¼x5½	G,K	3
Twin City	12-20	....	4	Own	4-4¼x6	G,K	3
Twin City	20-35	....	4	Own	4-5½x6¾	G,K	5
Twin City	40-65	....	4	Own	4-7¾x9	G,K	8
Uncle Sam C20	12-20	1385	4	Weild.	4-4 x5½	G	2-3
Uncle Sam B19	20-30	2300	4	Beav.	4-4¾x6	G or K	3-4
Uncle Sam D21	20 30	2075	4	Beav.	4-4¾x6	G or K	3-4
Universal	1-4	475	2	Own	1-3½x5	G	1
Utilitor 501	2½-4	380	4	Own	1-3½x4½	G	5-6
Velie Biltwell	12-24	1750	4	Own	4-4½x5½	G,K,D	3
Victory 1921	9-18	1350	4	Gray.	4-3½x5	Gas.	2
Victory 1921	15-30	1750	4	Wauk	4-4¼x5¾	Gas.	3
Vim B	15-30	1650	4	Wauk	4-4⅜x5¾	G,K	3
Wallis K	15-25	1600	4	Own	4-4¼x5¾	G,K	3
Waterloo N	12-25	....	4	Own	2-6½x7	G,K	3
Webfoot 40	25-40	4000	..	....	.....	.....	..
Webfoot 53	28-53	5250	*2	Wisc.	4-5¾x7	G,D	6
Wellington B	12-22	1600	4	Erd.	4-4 x6	Ker.	2-3
Wellington F	16-30	2100	4	Chief	4-4¾x6	Ker.	3-4
Western. 1920	16-32	2100	4	Clim.	4-5x6½	Gas.	4
Wetmore	12-25	1650	4	Wauk	4-4 x5¾	G,K	3
Wharton E	12-20	1800	3	Buda	4-4¼x5½	Gas.	2
Whitney	9-18	1175	4	Own	2-5½x6½	Gas.	2
Wichita T	15-30	2500	4	Beav.	4-4½x6	G,K,D	3-4
Wisconsin E	16-30	....	4	Clim.	4-5 x6½	Ker.	4
Wisconsin H	22-40	....	4	Clim.	4-5½x7	Ker.	5
Yuba 15-25	15-25	2945	..	Wisc.	4-4¼x6	G,K,D	..
Yuba 25-40	25-40	4892	..	Wisc.	4-5¾x7	G,K,D	..
Zelle	12-25	....	4	....	4-4¼x5½	G or K	3

ABBREVIATIONS: G—Gasoline, K—Kerosene, D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make; Beav.—Beaver, Clim.—Climax, Cont.—Continental, Dom.—Domas, Evin.—Evinrude, Herc.—Hercules, LeR.—LeRoi, Midw.—Midwest, Nway.—New Way, Nor.—Northway, Strns.—Stearns, T.C.—Twin City, Wauk.—Waukesha, Weidely, Wis.—Wisconsin, *—Crawler type. All others are wheel type.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Reno, Nev.	Automobile Show	July 4-9
Indianapolis	Automobile and Accessory Show	Sept 6-10
Cincinnati	Fall Automobile Show	Oct. 1-8
Chicago	Automotive Equipment Show	Nov. 14 to 19
New York	Automobile Salon	Nov. 27-Dec. 3
Chicago	Automobile Salon	January—1922

TRACTOR DEMONSTRATIONS

Fargo, N. D.		June 28, 29, 30

RACES

Cincinnati	Speedway Race (Possible)	July 4
Tacoma	Speedway Race	July 24
La Mans	French Grand Prix	July 25
Elgin	Road Race (Possible)	August 3
Pikes Peak	Hill Climb	September 5
Uniontown Speedway	Annual Autumn Classic	September 5
Los Angeles	Speedway Race	November 24

FOREIGN SHOWS

Reykjavik, Iceland	Agricultural Machinery	June, 1921
Buenos Aires, Argentina	Passenger Cars and Equipment	September
Luxemburg	Luxemburg Agricultural Sample Exhibition	September
Paris, France	Paris Motor Show	October 5-16
London	British Motor Show, Society Motor Mfrs. and Traders	Nov. 4-12

CONVENTIONS

Greenville, S. C.	South Carolina Automotive Trade Association	July 20
Mackinac Island, Mich.	Summer Meeting Automotive Equipment Association	July 4-9
Chicago	Twenty-eighth Annual Convention National Implement & Vehicle Association	Oct. 12-14
Cleveland	National Tire Dealers' Association	November

Business Notes

The Los Angeles Trailer Co., Los Angeles, has changed its name to the Utility Trailer Mfg. Co. The personnel of the company is unchanged.

H. & E. Motor Co., Raleigh, N. C., has been chartered with an authorized capital of $25,000, with $10,000 paid in by B. G. Aronson, A. A. Aronson, O. R. Brown and A. H. Brown. The corporation takes over the local distribution of the Hudson and Essex automobiles, until recently handled by the Horton Motor Co.

The Maxwell Motor Corp., of Indianapolis, has been reorganized and the company has filed legal papers with the secretary of state which will qualify it to do business here. John Burns, of Newcastle, Ind., has been named as the Indiana agent.

The Arvas Manufacturing Co., operating an automobile accessory factory at Anderson, has notified a number of employees to return to work and that they intend to increase their output May 31.

Smith Springfield Body Co., West Springfield, Mass., is to increase its plant output 50 per cent and 100 additional men are to be employed, according to announcement by officials of the company.

Nojak, a new device, is being marketed by the Commercial Manufacturing Co. of Detroit, taking the place of the old style automatic jack, and negotiations for making the device standard equipment on at least four Detroit cars are under way. It consists of a steel casting weighing about six pounds, and is inserted in two small holes bored in the felloe of the automobile or truck wheel. By going forward or back a few feet until the wheel rises on the Nojak the wheel is lifted into position for tire changing in a few seconds. It also serves as a spare tire guard and a mud or hand hook for driving through heavy roads.

Canton Foundry & Machine Co. has changed location of its New York office from the Grand Central Palace to 45 West 18th street.

The Ford Motor Co., of Canada, has declared its regular annual dividend of 15 per cent.

C. R. Wilson Body Co. has authorized payment of the regular quarterly dividend of 1¾ per cent on preferred to stockholders June 30. The dividend will be paid July 1.

A. M. Brackett Motor Co. has opened quarter in Automobile Row at Des Moines, Iowa, handling Mack trucks. It has taken over the interests of the O'Dell-Hamilton company, with M. H. Bearse as manager.

The Kissel Kar Co., of Milwaukee, a large territorial distributor of Kissel passenger and commercial cars, has been reorganized following the acquisition of the major interest by Adolph C. Hoppe, for 15 years connected with the dealer trade in Wisconsin. He becomes president and general manager. Frank J. Edwards, who established the business, is now devoting his entire time to the Edwards Motor Car Co., Dodge distributor, and other extensive commercial enterprises. Mr. Hoppe formerly was a member of the Hoppe-Hatter Motor Co.

Mitchell-Springfield Co. is the new Mitchell dealer in the Springfield, Mass., territory. The Mitchell Sales Co. has been named dealer for the Rochester, N. Y. territory.

Brewer Motor Car Co., of Spokane, has taken over the new Moon line, in addition to the Scripps-Booth, and the Cole Aero-Eight. The Brewer company is acting as direct factory distributor and has that part of Washington east of the Cascades, Idaho north of the Salmon river and northeastern Montana.

New Departure Manufacturing Co. has moved its Chicago offices from 2721 to 122 South Michigan avenue.

The Franklin Automobile Co. has declared a common stock dividend of 50 cents per share payable July 11, to stockholders of record June 30, 1921. Profits for the first five months of 1921 are estimated to be in excess of $775,000 after taxes.

Templar Motors, Inc., of Philadelphia, is the new trading name of the firm of Compton-Butler, Inc., distributor of Templar cars in the Philadelphia district. The officers of the new firm are O. S. Compton, president, and T. E. Schmidt, secretary and treasurer.

The Greensburg Automotive Assn. has been organized at Greensburg, Pa., for the purpose of furthering the interests of the automobile and its accompanying industries. It now has a live membership of 30 and is going strong. P. H. Bailey is president; M. M. Rose, vice-president and Paul Seaman, secretary and treasurer.

Greenfield Tap & Die Corp. has voted to purchase the capital stock of the Greenfield Machine Co., manufacturers of cylindrical and universal grinders and the Morgan Grinder Co. of grinders.

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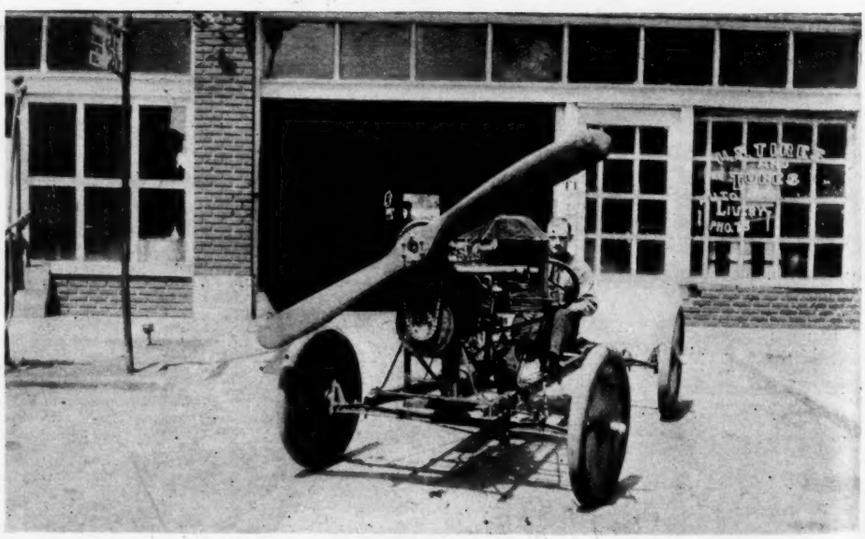
Speedster-Motorplane Has High Power



Motorplane in which Johnnie Mercer is circling half-mile tracks in 38 seconds. Its builder claims that it will do 80 miles on straight-away. The machine mounts a 6 f.t 4 in. propeller and is powered by a rebuilt Ford engine. The propeller is run by chain attached to the engine and the speed of each is 1100 and 2200 r.p.m. respectively. Mercer says his machine has "all the power in the world" and that he expects to build five more exhibition speedsters this winter